UNIVERSITY OF VAASA

SCHOOL OF ACCOUNTING AND FINANCE

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SHORT-TERM IMPACT OF STOCK REPURCHASE PROGRAMS ON STOCK PRICE

Master`s Thesis in

Finance

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TABLE OF CONTENTS page

LIST OF FIGURES

page

LIST OF TABLES

page

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ABSTRACT

The purpose of this master´s thesis is to study short-term effects of stock repurchase programs. The study aims to document effects during different time periods of stock buyback programs using actual buybacks, following periods when firms do not acquire any shares. This allows to expand ongoing research and show what effects does quitting repurchases have on the stock price.

Thesis uses Finnish data to achieve the goal to examine day-to-day effects because of the regulations in Finland which demand companies to announce daily buybacks before the next trading day. Data have been hand-picked from Nasdaq Helsinki company releases using time period of 2008 to 2017. Total sample includes 7 215 days of stock repurchases which are examined as daily observations, formed into portfolios of at least 10-days (99 events) and 15-days (63 events) of continuous buybacks and portfolio of 25-days (63 events) of buybacks with maximum of three days without any stock repurchases. All event periods follow a ten-day period without any stock repurchases to examine the effect when quitting the buybacks.

The results suggest that actual buybacks have a positive daily effect of 0,0815 % on the stock price, while quitting buybacks has a negative effect on the stock price. The biggest positive and negative effects are mainly on ten-day period around quitting the buybacks. Positive average abnormal returns start to cumulate in around six days before a company ends their stock repurchases. Negative returns start to cumulate directly after a company quits buybacks for around four days. Considering the main event window and overall effect of stock buybacks study finds to have mixing results, ten-day portfolio reports negative CAAR, when 15-days and 25-days portfolios report positive average abnormal returns with only 25-day portfolio having statistically significant results.

KEYWORDS: Stock repurchase, Open market, Buyback program, Nasdaq OMX Helsinki, Event Study

1. INTRODUCTION

What happens when companies acquire their own shares with an open-market program? This is a commonly asked question among literature and a point of interest for every investor. Stock buybacks have grown rapidly from 1980´s to this day, and an investor can see again bigger program announcements in U.S. stock market, thanks to the new tax reform where companies are distributing profits to shareholders. Tomperi (2004) described capital market reactions as shown in figure 1, with good news the market reacts positively and with bad news the stock price declines. To know whether the news is good or bad, one needs information about consequences of the new information. To know what happens, we trust on prior data, and it tells us that the stock price tends to rise when company announces a repurchase program as well as with buybacks, but what happens after the buybacks are done?

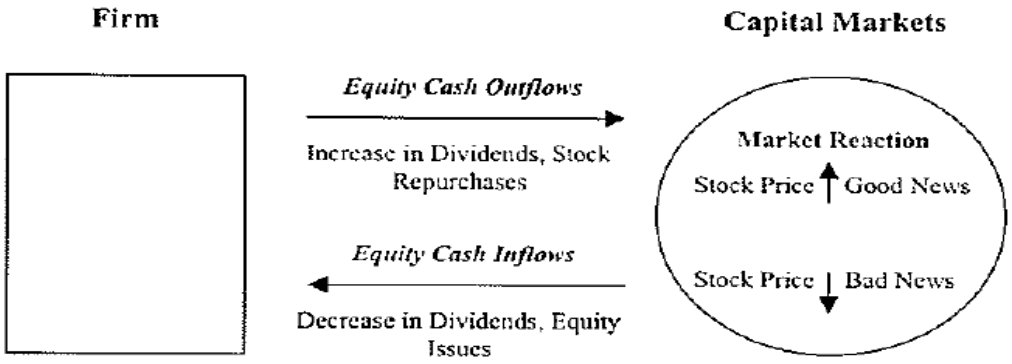


Figure 1. Capital market reaction to Equity cash flow decisions (Tomperi 2004.)

Kowerski (2011) study examined the current situation and a dividend-based model pricing (equation 1) with companies that acquire their shares. The study argues that the old dividend yield ratio model should be updated into a new model that notes also the

value of buybacks (equation 2), this allows an investor to get more accurate information about distributed cash.

(1) $$DYR = \frac{\text{Dividend per share}}{\text{Share market price}} x\ 100\ \%$$

(2) $$Total\ yield\ ratio = \frac{\text{Dividend and value of repurshased shares per 1 share}}{Share\ market\ price}\ x\ 100\ \%$$

Taking both dividends and stock repurchases in concern is important when pricing a company and evaluating what kind of cash flows it has been distributing to shareholders before. As figure 2 shows, an evidence from U.S. markets documents that even dividend yield ratio has declined during sample period of 1972 to 2000, total yield ratio has stayed close to 2 %. This suggests that dividend ratio is not as well functioning factor anymore considering payout. Using Kowerski (2011) modification of the old dividend-based model, investors will achieve a more realistic picture about payout. When firms are using more stock repurchases, it is necessary to know and understand the function of their effects on stock markets.

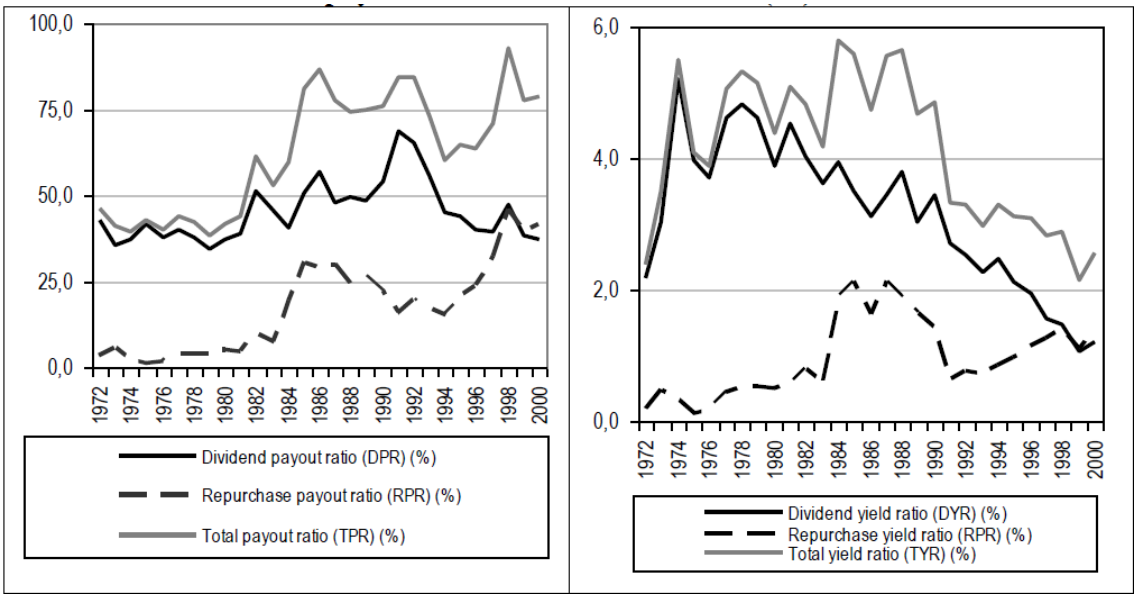


Figure 2. DPR, RPR and TPR & DYR, RPR, RYR (Kowerski 2011.)

Overall, the subject of stock repurchases is needed for new and updated information about different consequences of buybacks. This study will focus on getting updated and new information to be used for investment opportunities. When the number of firms acquiring their shares has grown from 25 % to over 50 % between 1975 and 2015 (figure 3), it gives bigger opportunity for investors in profiting from an ending buyback program. Investors can, for example, make assumptions when buybacks will end using dates of a starting quiet period or if a company has announced it will buyback shares between dates of X to Y or with some other way. This study will give light to if one could profit in their trading considering these dates.

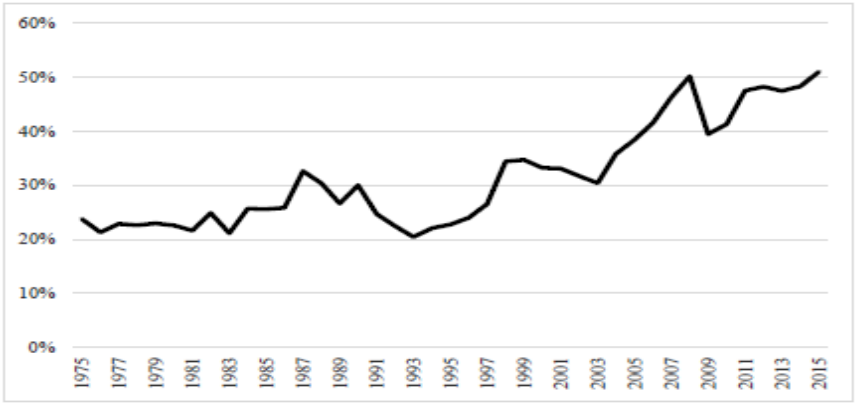


Figure 3. Number of firms repurchasing shares 1975 - 2015 (Bonaimé et al. 2018)

1.1. Purpose of the study

When previous researches (Vermaelen 1981; Kahle 2001; Högholm & Höghom 2017; Dittmar & Field 2016; Gupta 2017; Keasler & Byerly 2015) have documented abnormal returns in an announcement, in post-announcement and during buybacks, as well as studies have documented long-term abnormal results (Yook 2010). Recently, academics have focused mainly on examine the abnormal returns on the above-mentioned topics. The purpose of this study is to examine with Finnish data the current situation

considering the days when companies repurchase their shares and obtain *new information about what happens directly after buybacks*. Lately, there has been again a growth in U.S. stock markets in repurchase announcements and actual repurchases, and because of different regulations in Finland there is a possibility to study what happens during stock buybacks and directly after a company ends repurchases. This much needed information can be used in a bigger scale to examine different situations with bigger data sets that need more assumptions. For example, if study finds significant impacts when firms end their buybacks, similar study can be done with SP500 companies that have long-lasting buybacks going on making assumptions that a firm buy shares each day and quits just for announced quiet periods (or silent periods). To do these assumptions, it would be helpful for academics to know first what happens when examine the daily observations with country that has regulations to announce also the daily buybacks, as in Finland.

Based on the efficient market hypothesis (Fama 1970), abnormal returns should disappear from markets with time, because people change their behavior regarding the new information. With this suggestion, companies should get abnormal returns during an announcement (new information), not with each day a company buyback their shares. This study examines also whether there are abnormal returns during the daily observations of buybacks, to see do investors undervalue the information considering buyback announcements.

Considering buybacks, in Finland the laws and regulations differ from The United States. Because of the regulation that public companies need to announce daily repurchases in Finland, this allows this study to examine how returns cumulate during days when companies are buying back shares and days directly after buybacks. This study uses precise dates and examines should one act differently with a certain break or ending coming to buybacks. In my knowledge, this is the first study considering days directly after buybacks, and much-needed information considering a future analysis of S&P 500 companies which would need much more assumptions about actual buying dates and

breaks. The contribution of this study and for this topic will be to get updated information from daily data from Finnish stock markets and new information on what happens when a company ends it´s buybacks.

1.2. Formation of the research hypotheses

This study will examine what happens during and after stock repurchase programs in short-term. Overall, previous research has suggested that an announcement effect and effects of long-term stock buyback programs gain positive abnormal returns. The question of short-term effects after buybacks are, however, much less examined topic as most countries do not have regulations to publish daily repurchases. This study will focus on Finnish data to measure what exactly happens in the time that a company ends their buybacks for one reason or another. These reasons can be for example, that a company has reached total dollar or volume target of buyback program or has an upcoming financial report announcement and have a necessary quiet period of two weeks to one month depending on the firm.

The research hypotheses are that the daily stock buyback programs have a positive daily impact during the repurchases and ending stock buyback program has a negative impact on stock price, which will be examined with a portfolio of 10-, 15- and 25-days of repurchases following a 10-day period without buybacks. These hypotheses will be tested by an event study, to examine the exact day-to-day effects of periods of buyback days and after-acquisitions. The motivation for these portfolio formations is based on the nature of stock buybacks, even it has not been done previously in academic literature. However, when examining fundamentally quite similar ex-dividend days impact on the stock price it is often done by event studies in time frame of [-10;10], [-20;20] or [-10;20] as in studies Dasilas (2009), Garcia-Blandon & Martinez-Blasco (2012), Yilmaz & Gulay (2006) and Athanassakos & Fowler (1993).

In the authors opinion, the portfolio formation can be motivated by the following characteristics of buyback programs. Firstly, considering most publicly listed companies announce financial data after every quarter and most of the companies in the dataset have quiet periods between two weeks to one month before the financial release. This makes maximum amount of successive repurchase days equal to two months of trading, about 45 days. Thus, theoretically maximum considering this study is 45 trading days. Because of the low amount of long-lasting stock repurchase programs in Finland, study is reducing the maximum portfolio to 25-days with allowance that the time period can have three days without buybacks.

Secondly, when the dataset includes mainly maximum of 15-days of daily repurchases study chooses time periods of 10-days and 15-days for examine of continuous repurchases. In the author`s opinion, this formation should not distort results as the portfolios aim to answer for hypothesis two which concerns the post-buyback period. Even it might narrow down our number of samples, author´s opinion is that these portfolios do reflect the real stock buyback programs with the best way to do research from this new topic.

Thirdly, the motivation to choose a time period of ten days when examining post-buyback periods in each portfolio is in possible quiet period minimum of two weeks equaling to ten trading days as describe above.

Thus, hypotheses are

H_1: Daily stock buyback have a positive effect on the stock price

H_2: Ending stock buybacks have a negative effect on the stock price

The daily effect will be tested using every single buyback as an own event without limitations of size, volume or press releases.

1.3. Structure of the thesis

The thesis is structured so that the first chapter is an introduction including the hypotheses and motivation for the study. The second chapter is an overview about what the previous literature tells us about stock buybacks, including methods of stock buybacks and reasons behind repurchases as well as the effects of repurchases based on previous literature and laws and regulations in Finland.

The third chapter will disclose the data used for this study and methodology of the study. The fourth chapter is focusing on the results reveled with our unique daily data and sixth chapter is concluding the thesis.

2. LITERATURE REVIEW ON THE PROGRAMMES & THE REGULATIONS

This chapter will give an overview of stock buy-back programs in the global aspect, focusing on studies from US markets. First study will discuss about the different methods for stock repurchases and after that the reasons behind buyback programs. The third subchapter will include laws and regulations in Finland as it is one of the main motivations to use Finnish data for study.

2.1. Methods for share repurchase programs

After companies have chosen to use stock repurchases, they need to choose which one of the stock buyback program type fits best to their targets. There are three well-known and some less studied ways to complete the wanted repurchases. Those are overall mostly used *open market program,* less commonly used *fixed-price tender offer* and rarely used *Dutch auction* (Grullon & Ikenberry 2000; Stonham 2002). Fourth possibility is a less studied form, *negotiating sales by selected investors* (Kowerski 2011). The US markets started using stock repurchase programs more in the mid-1980s, even both open markets repurchase and tender-offers have been available in the US markets for decades (Grullon et al. 2000.) Because of the rare use of Dutch auctions as a repurchase method, some studies, such as Oded (2011) and Stonham (2002), has excluded the Dutch actions out of their studies.

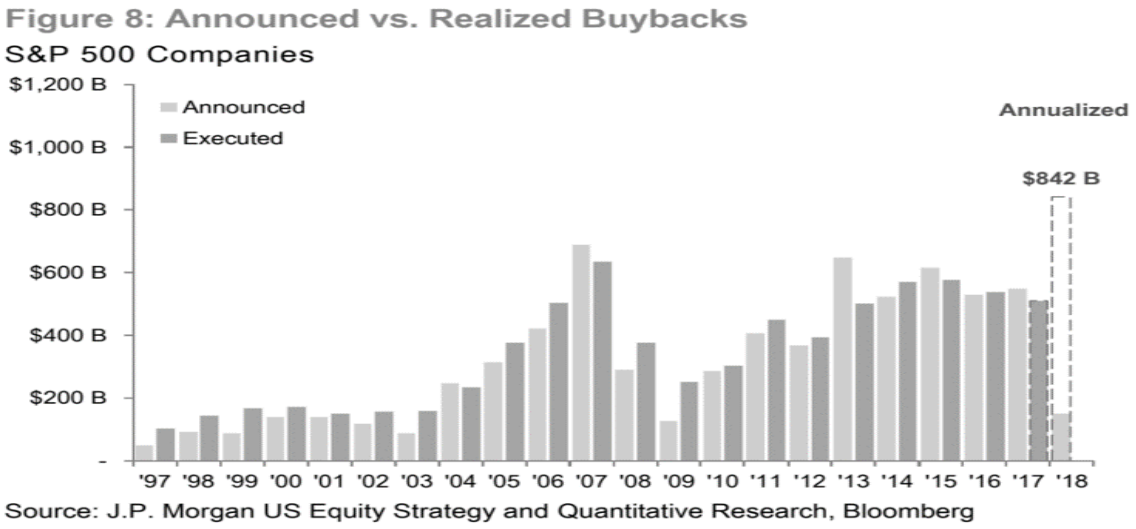
Based on study from Grullon et al. (2000) open market programs have been significantly most used method in the period of 1980 to 1999 in US markets. The study suggests that overall open market programs cover 91 % of the total value of repurchase announcements being on the highest in 1995 when covering 98 % of all buy-back announcements.

Table 1. Buyback programs and the values 80-99 (Grullon et al. 2000.)

	Dutch auction tender offer		Fixed tender offer		Open market programs	
Year	Programs	Worth (mil.)	Programs	Worth (mil.)	Programs	Worth (mil.)
1980	0	0	1	5	86	1,429
1981	0	0	44	1,329	95	3,013
1982	0	0	40	1,164	129	3,112
1983	0	0	40	1,352	53	2,278
1984	1	9	67	10,571	236	14,91
1985	6	1,123	36	13,352	159	22,786
1986	11	2,332	20	5,492	219	28,417
1987	9	1,502	42	4,764	132	34,787
1988	21	7,695	32	3,826	276	33,15
1989	22	5,044	49	1,939	499	62,873
1990	10	1,933	41	3,463	778	39,733
1991	4	739	51	4,715	282	16,139
1992	7	1,638	37	1,488	447	32,635
1993	5	1,291	51	1,094	461	35
1994	10	925	52	2,796	824	71,036
1995	8	969	40	542	851	81,591
1996	22	2,774	37	2,562	1,111	157,917
1997	30	5,442	35	2,552	967	163,688
1998	20	2,64	13	4,364	1,537	215,012
1999	19	3,817	21	1,79	1,212	137,015

As can be seen from table 1, open market programs have grown almost a-hundred-fold times in value when the program count has grown fifteen-fold. As can be inferred, the value of programs has also grown significantly in the period. The value of repurchases is still rising, Ossinger & Popina (2018) wrote in a Bloomberg article that the new estimates for total value of US buybacks is expected to be as much as $800 billion in 2018, thanks to the tax-cut from President Donald Trump. So, even the value has risen significantly in 19-years period, it looks like the biggest boom in the total value of buyback programs has slightly cooled within the -00´s tech bubble and -08´s financial crisis.

Table 2. Total buybacks 99-18 (Ossinger & Popina 2018.)



After financial crisis cooled down, based on figures by J.P. Morgan in table 2, the total amount of S&P 500 companies repurchase programs have settled down in about $500 billion annually. Interestingly, value of announced and executed stock repurchases are not significantly different, which means that companies that announce programs often also go through with the buybacks. The study will next describe the three types of stock buy-backs, focusing on the most common one, open market programs.

2.1.1. Open market program

As told before, open market (or on-market) programs are so far the most common way for companies to acquire their own shares from the market. The reason why open market programs are so widely used, is the reason of quite flexible compared to the two others. The flexibility comes from when a company chooses to announce a share buyback program, there are usually still some questions for the management to sort out, such as what will be the exact amount of money to spend for share acquisitions. After announcement companies can still choose whether to repurchase the shares, or for how much. Open market programs are also flexible over time, and companies can choose a

period that suits their needs the best, such as seeing the stock as undervalued and by this maximize the long-term shareholder value (Ikenberry et al. 1996). In US markets, size or duration, nor threading is a limited factor with buyback programs as can be witnessed with Apple Inc.´s $210 billion repurchase program threaded in 2013 to 2017 after adding again $100 billion in the program in 2018 (Weinberger 2017; Fingas 2018). However, it has been proven that the normal size of open market programs is about five percent of total shares (Grullon et al. 2000.)

When a company chooses to implement the transactions, it usually authorizes a bank to acquire shares worth a certain amount in a certain timeline. After the shares are bought, they are either deleted or kept by the company to be given for stock option programs. Stonham (2002) study describes situations when firms typically choose to use *open market programs* over tender offers as:

> *"Managers prefer open-market repurchases when markets are turbulent, their firms do not have financial slack (e.g. excess cash flow), and are highly leveraged (and therefore find external financing expensive). Such firms will tend to be larger, more heavily analysed, and therefore are less likely to be undervalued by the stock market."*

Stonham (2002) study explains also that one of the problems with long lasting open market programs can be that these programs usually do not draw out the unwanted investors. Rather, the reverse effect happens.

Stephens & Weisbach (1998) studied the actual repurchases against announcements of buybacks and based on their data of 450 programs between 1981 to 1990 companies used the flexibility of open market programs well. Firms acquired average of 74 to 85 percent of the total amount of the announced shares. The percent of actual repurchases

varies between firms, as study suggests that 57 % of the firms bought at least that amount of shares they originally announced for within 3 years when only 10 % bought less than 5 %. Research states that the substantial number of companies did not actually buy a single share because of unknown reasons. So, based on the study, one might say the announcements either lead to buying all the shares or none of the shares.

2.1.2. Fixed-price tender offer

Grullon et al. (2000) defines fixed-price tender offer as it is named, firm giving a specified price to all shareholders to tender their shares for. Study describes that the offer is usually valid for a limited period and can contain a minimum and maximum number of shares for shareholders to tender and for company to buy. When the amount of offered shares exceeds the amount that company has announced to buy, management has the option to choose whether to buy all the shares or just the announced amount. In cases where the company chooses to buy only the announced shares, investors will receive back over-offered shares.

Fixed-price tender offers are a great way to buy a block of shares in a short period of time and are used in cases when the management wants to send a clear message for undervalued stock price (Grullon et al. 2000). Stonham (2002) study describes situations when company typically chooses *fixed-price tender* offer over open-market program as:

> *"Managers are motivated to choose tender offers when their firms have comparatively high cash flows, poor investment opportunities, large shareholder stakes, high dividend yields and greater volatility of returns. Such firms are likely to be small."*

Study by Grullon et al. (2000) notes that typical tender offers are on average 15 % of total shares, so as told before, one of the motives is the opportunity to buy a block of

shares in a fast timetable compared to open market programs. In the same time, it is told that tender offers give a dramatic change considering company´s capital structure and usually per share valuation. Valuation changes because company usually tries to give a signal that their firm is undervalued and pays a premium when buying back the shares and investors believe that the management knows the real value better.

Studies also provide data for undervaluation hypothesis especially with tender offers. There is a research that as much as 74 % of the firms that buyback the shares via fixed-price tender offers are in fact undervalued based on economic value (EV). Study also provide a suggestion that the management is usually quite conservative when setting the premium and it is highly correlated with the magnitude of undervaluation. D´mello & Shroff (2000) study uses the residual income model (RIM) when estimating economic value for companies.

(3) $$EV_t = B_t + (1 + r)\, E_t [X_{t+i} - r * B_{t+j-1}],$$

Where B_t stands for book value in time t and X_t earnings for time t, r stands for cost of equity capital what can be calculated with the CAPM model;

(4) $$E(r) = r_f + B_A[E_{(rm)} - r_f]$$

The study also provides data that the undervaluation hypothesis does not always fit, as the model shows results of overvalued firms using tender offers as buyback method as well. These cases are usually motivated by some other purpose such as one of the reasons behind buy-backs described later in this study.

Study by Comment & Jarrell (1991) explains that the undervaluation is based on the company perspective and the management is not thought to take part for analyzing the stock market undervaluation situations, even study from Gu & Schinski (2003) argues that in cases with bigger scale catastrophes, such as 9/11 or market crash in 1987

companies announced repurchase programs to reassure the markets. Total amount of US announced buybacks in 9/11 was $12,1 billion and in market crash $9,3 billion dollars.

Study by Karhunen (2001) focused in answering a question about who the tendering part is while companies are using tender offer as buyback method with a dataset from Finnish stock markets. Results suggest that even literature explains that tender offers do not draw out unwanted investors, some variables are related to knowing the tendering part. While private investors do not realize losses as likely as institutional investors, capital gains taxes affect whether one will tender their shares. Thus, with private investors most likely investor that will be tendering will be an investor who is taking profits (i.e. stocks that have risen) and it is recognized that households tend to tender rather older stock than newer. Households, however, will be optimizing their capital gains taxes in end of the year, mainly in December, so they will be more likely to tender shares with losses. Households are also more likely to tender in the age of retirement, suggesting that investors are cashing out positions in that point of time. Institutional owners tend to tender newer shares which can be explained by speculative buy before buyback announcements. Study also notes that in Finnish markets the highest number of shares is bought back at end of the year, September to November, which might be reasoned by companies trying to pull out small investors and obtain institutional owners. Interestingly, lowest number of buybacks being in March to May, which one can assume to be because of the most firms hold annual meetings in that time. Companies might want to postpone buybacks after revealing financials to meet their targets.

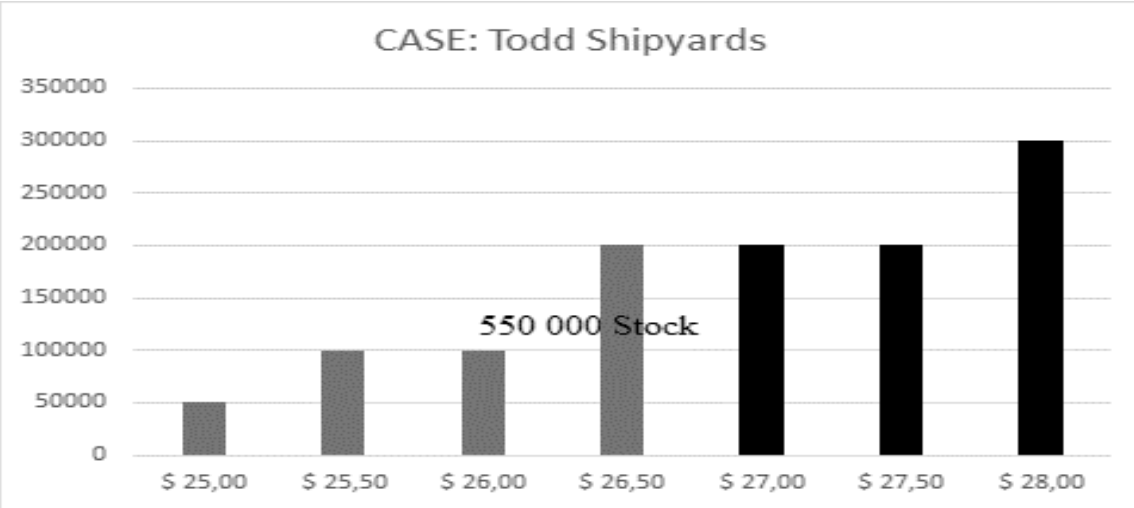
2.1.3. Dutch auction tender offer and other rarely used methods

The Dutch auction tender offer is quite the same as fixed-price tender offer, so they are often referred as one and the same. Despite of the similarity of tender offering, the process goes differently. Dutch auction started in the Dutch flowers markets when

aiming to get as high price as possible and is used reverse way when repurchasing shares. Based on Bagwell (1992) Dutch auction became as one of the buyback methods when Todd Shipyards planned to perform a Dutch auction where they tender 200 000 to 550 000 shares from 5 500 000 shares with a price that do not exceed $28. Todd Shipyards made a deal with Bear Stearns to be paid as a fee 30 % of the total savings if shares were bought with less than $28. To maximize their commission, Bearn Stearns developed Dutch Auction to use with stock buybacks as well.

The companies chose to implement first Dutch auction repurchase where investors chose the amount they offered and for what price. For an example, a case as described in Bagwell (1992), is shown in figure 1 to demonstrate the idea of a Dutch auction. Investors have offered their shares with the price that they see suitable, and the company is buying the wanted number of shares with as low price as possible. All investors will get anyways the highest paid price, as SEC requires under nondiscrimination or “best-price provision” regulations (Bagwell 1992.)

Figure 4. Example for Dutch auction case like Todd Shipyards



Study suggests that the average price is 13,4 % higher than market price using Dutch auctions, and the companies are buying between 18,03 to 20,07 % of the total shares. As told before, one of the main purposes to use tender offers are that they are fast to

implement. The mean duration for whole offer is only 22 business days based on research. (Bagwell 1992)

Grullon et al. (2000) combines Dutch auction and fixed-price tender offer both as fixed-price deal, the price is just given differently. Where in fixed-price tender offers the management is giving the price, investors have the possibility to affect into the price in Dutch auction. The study sums that Dutch auction is a great method especially for companies who want to buyback a large block of shares as cheap as possible paying less of a premium in the process. Thus, it can be said that the Dutch auction is greater for long-term shareholder value, but fixed-price tender offers tend to close the cap if markets have undervalued stock from managements perspective.

The most unknown ways to repurchase the shares are by negotiating sales by selected investors, done off-the-market, open the counter repurchases or privately negotiated repurchases as describe in Kowerski (2011) research. These forms, however, have been typically ignored by the researchers as they are illegal in most countries, besides US, explained by the study.

2.2. Reasons for share repurchase programs

The popularity of stock repurchase programs has risen wildly since the early-1970s. When studies have documented that from 1972 to 1983 the total amount of repurchases was less than 4,5 % of total earnings, it rose to 25 % in period between 1984 to 1998 (Grullon et al. 2000.) Grullon & Michaely (2002) documented that share repurchases programs increased into 41,8 % of total earnings in 2000.

Firms typically announce a reason why they are using repurchases, *such as excess capital, getting optimal capital structure, undervaluation, compensation of shareholder or management, EPS bump, defense against hostile takeover*, or other (Grullon et al.

2000; Dittmar 2000; Sinha 1991.) However, these reasons do not give the whole truth. The factor of tax advantage of share repurchases is well documented in literature (Grullon et al 2000; Grullon et al. 2002), even most companies do not use it as an announced reason when starting a buyback program. This factor, however, is not the main reason when publishing repurchase programs based on Dittmar (2000). Research shows the results when capital gains taxes has been changing from 35 % - 28 % - 20 %, 28 % to 20 %, in periods of prior to 1978, after 1978, after 1981, after 1986 and after 1997, respectively. As the changes suggest if the repurchases would be dependent on capital gains taxes, buybacks should show these changes, which they do not. Also, it can be argued that stock buybacks have become quite common in Finland based on this study, even tax profits of buybacks are gone in Finland because investors can reduce losses and dividends from capital gains. In Finland, dividends are taxed by 85/15 regulation which means that 15 % of dividends are tax free, when capital gains are taxable overall. This should lead to a situation where companies prefer dividends over buybacks, which has not happened as will be seen later in this study. (Finlex 1.)

Study by Karhunen (2002) examined the announced reasons of buybacks in Finnish stock market from 1998 to November 2001 and notes that firms might point out more than just one reason for the repurchases. As shown in figure 5, “acquisition or other investments” is counting for 85 % of all buybacks, still most have at least one other reason mentioned. Interestingly, only 10 % of firms mention undervaluation as a reason even it is one of the most studied factors among academic literature when also improving capital structure counts for 55 % of announcements, but excess capital only 15 % which one could argue that are somehow more closely connected to each other.

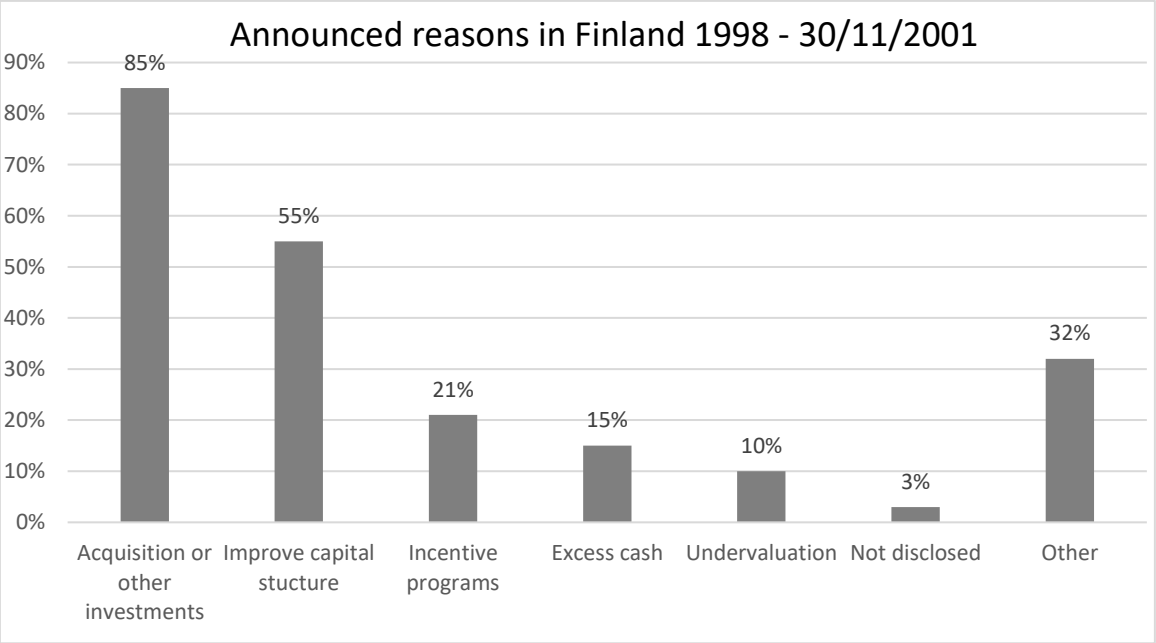


Figure 5. Announced reasons for repurchasing programs (Karhunen 2002: 92)

This chapter will now explain the most common reasons in announced buyback programs and data that has already been provided by the academic literature. A company is usually using the announcements to signal for one or more of the situations.

2.2.1. Excess capital, optimal capital structure & signaling

Study by Eisenhardt (1989) defined something called the agency problem. When most companies have divided ownership and management, there might be problems with having excess capital. Based on the study, management might benefit from the excess cash and neglect the rights of shareholders. These situations can be avoided by distributing the excess capital back to shareholders with buyback programs or dividends. Especially in situations where there is a lack of investment opportunities, to avoid agency problems shareholders usually want to see excess capital distributed to them. On the other hand, Modgiglian and Miller (1958) presents a theory that it does not matter how company distributes the cash if taxes and other are taken as constant.

Because this is not the case in real world, companies might prefer repurchases over dividends when it is more tax-efficient.

Study by Bradley, Jarrel & Kim (1984) defines the math behind an optimal capital structure. When talking about capital structure, the question is how much a company should have equity and how much debt when considering variables. Ratio can be somewhere near 40 %, depending on firm-specific and industry-specific characteristics.

Considering the leverage-related costs, such as agency costs, bankruptcy costs and the cost of tax shields and if equity income is untaxed it will lead into a positive tax advantage if the bondholders tax rate is less than corporates. Agency costs and bankruptcy costs rise in financial distress, so they can be counted as costs of financial distress. In short, based on Bradley et al. (1984) a company should issue debt if the cost to bondholders, $T_{pb,}$ is less than firms constant marginal tax rate, T_c:

(5) $$t_c - t_{pb} = \frac{t_c[F(\hat{Y}+\phi/t_c)-F(\hat{Y})]+(1-t_{pb})k\hat{Y}f(\hat{Y})}{[1-F(\hat{Y})]}$$

Where, t_c = firms constant marginal tax rate

t_{pb} = return of the bonds to investors

F(x) = cumulative probability density of function

Y = Total end-of-period promised to bondholders

ϕ = total after-tax value of non-debt shields if they are fully used at the end-of-period

k = costs of financial distress per dollar of end-of-period value of the firm

$\hat{Y}f$ = probability of the density of Y

Overall, Bradley et al. (1984) study finds that there are inverse relationships between leverage and costs of financial distress, as also with non-debt tax shields and variability of firm earnings. Notable, factors such industry-wide volatility in earnings, R&D costs and advertising costs affect also to the optimal capital structure.

When repurchases are used in real markets, they can be used to signal investors about positive future. When excess capital can be seen from the financial statements and optimal capital structure can be calculated, one might assume that the strongest signaling effect will reflect the future cash flows. When the efficient market hypothesis (Fama 1970) has been proven as an ideal idea of the markets, the management might have more inside knowledge about future cash flows than investors and wants cash flows priced into the stock. This information asymmetry, difference between instinct and market values, can be caught up with a press release of repurchase program. Grullon et al. (2000) study describes that if announcing just the new positive overlook of future, managements view can be more easily ignored until the numbers arrive. However, in cases where the information asymmetry of future cash flows will be tried to be removed by repurchase programs results are mixed. When early studies found modest growth, data from 1980 to 1994 does not (Grullon et al. 2000.) In the data period, it is been proven decline in operating income which might lead to another reason of repurchase programs, aiming for an increase in earnings per share, or in this case keeping the level that company operates in.

When the studies have documented repurchase announcements usually as a positive signal about future, there are also known situations when managers might try to use this as “cheap talk” to achieve abnormal return. With the characteristics of open market programs, managers are using the flexibility to announce the programs without any plan to pursuit with it and might use it as a tool to boost the stock price. Markets, however, remember the past track record and this tool is not useful for a long time. Chan, Ikenberry, Lee & Wang (2010) have reported that firms with low earnings quality do enjoy a small benefit in short-term but in long term the abnormal returns disappear. Chang, Chen & Chen, however, reported that when the markets do remember past track record firms with a strong past with announcements and signaling future cash flows will get more positive welcome from markets. One reason for the management to give a false signal is reasoned by option-based salary system together with aiming to fulfil their EPS-target.

2.2.2. Undervaluation

When the future cash flows are known and information about future is well-enough told, value of a company should be easily calculated and be worth as much as the dividends will sum when discounted to present value. Dividend discount model (DDM), by Farrel (1985), gives an easy, and quick way to calculate the expected value of future cash flows with:

(6) $$Value\ of\ company = \frac{\text{Dividend}}{\text{Discount rate} - \text{expected growth}}$$

Where the discount rate is collective effect of the risk-free return and risk premium. Even investors have different expectations and risk premiums, DDM will supply a quick check about the expected value of a company.

When the company is undervalued based on management opinion and calculations, it should be caught up to maximize the long-term shareholder value. Study by D´mello et al. (2000) examines whether companies repurchase stock when they are undervalued using the difference in instinct and market values. Study finds that 74 percent of firms that are repurchasing are undervalued, compared to 51 percent with control sample of non-repurchasing firms. Study describes that companies trying to signal undervaluation used tender offers and buy stock using conservative premiums. Used premiums, however, are highly correlated with the magnitude of undervaluation and as described earlier, the biggest effect is given when tender program is used by small firms.

When Dittmar (2000) study examines the undervaluation hypothesis, study comes with a conclusion that usually the undervaluation is not the only reason behind the repurchases. Based on the study, firms tend to consider multiple reasons when choosing whether to implement stock buybacks. Research has shown that when tender offers are a good way to signal about undervaluation, open market programs are not. Ikenberry,

Lakonishok & Vermaelen (1995) study describes that there is larger effect with tender offers compared to open market programs, 12,1 % abnormal returns in next four-year period after open market program announcement with buy-and-hold strategy. This demonstrates that markets do not catch up the price even when program announcement are trying to signal about the information asymmetry.

With a data sample of 2004 to 2011 from US markets, study by Dittmar (2016) describes that companies that are infrequent buyers achieved abnormal return of 0,6 % per month over three months period and buyers 0,3 % per month over 36 months period when repurchasing stock over frequent buyers. Study describes that especially companies that buy shares infrequently have been better timing the markets than more frequently buying firms.

Study by Dittmar (2016) also documents that the firms that have announced undervalued as major reason behind a stock buyback program achieves bigger CAR in next three-day period compared to those who states as some different reason. Study shows that undervalued firms achieve CAR of 2.09 % when control group has 1.67 % cumulative abnormal return.

2.2.3. Compensation for shareholders and management

When investors are buying shares, they expect to be compensated for their investment. The traditional dividend-based model needs an update for some firms, that do not pay much dividends but compensates it´s shareholders using stock buyback programs. When compensating investors with dividends, it is done usually only one to four times a year, while with repurchases the amount is about 200, if considering the amount of trading days included in a year minus silent periods. By open market programs companies can compensate the shareholders every day they repurchase shares postponing the taxes to a shareholder friendly time for the long-term shareholders. This of course is seen as a great deal for many shareholders.

While the total value of dividends has reduced in US markets in the same time with the popularity growth with buybacks there are still use for both. Study by Guay & Harford (1999) have examined whether the origin of cash flows have an effect into the compensation style and with a conclusion of them to give different signals. Based on the study, companies aim in a slow-growing stable dividend and short-term excess cash flows to be distributed mostly by repurchases. While companies announce a repurchase program, they are signaling about short-term positive effects on the cash flows, and investors might take this as a sign about flat or negative expectations. While most managers are aiming to have a slow-growing dividend with announcements of using long-term excess cash flows in dividend growth, markets take it as a signal about positive long-term overview.

Dittmar (2000) notes that markets usually calculate the total tax efficiency for different compensation styles. In countries where losses on sales can be reduced from profits but not from dividend income, investors prefer more the repurchase based compensation. Even calculating a positive effect of repurchase tax-efficiency, one might argue that companies do not calculate it as a reason for different distribution. Dittmar (2000) study suggest that with firms which use buyback programs also to distribute the profits, dividend yields do not differ from comparison group. Thus, repurchases can be thought as a complementary part for compensating shareholders with excess short-term cash flows. This analyze can be thought also from Grullon et al. (2000) study, which describes that special dividends, occasional payments, as a compensation form has reduced dramatically in the same time as repurchase programs popularity has grown. Study by Kahle (2002) describes that even there is no evidence that repurchases have replaced special dividends, even in 1995 only 1,4 % of NYSE firms payed them – in the same time with rising the repurchasing programs.

Research from Kahle (2002) discusses matter when the buyback is not meant to be as the normal buyback programs compensating shareholders. Study describes that one of

the reasons behind an exponential increase in repurchase programs is because of the changes in payout policies. When companies compensate their management or other employees, stock options are getting more common since the very early 90´s. Early study from Kahle (2002) shows that in 1992 total value of stock options and grants were just $8.9 billion, the value grew to $45,6 billion for year 1997. However, recent studies have argued against the options and their effect for long-term shareholder value, which has led to declining option-based compensation. Study by Bonaimé, Kahle, Moore & Nemani (2018) shows with a hand-collected data from 1994 to 2012 that option grants grow 1,81 % of total shares outstanding in 1994, peak in 2000 to 2,99 %, before falling to 0,64 % in 2012. In the same time repurchases almost triple from 1% of total market capitalization to 2,8 %.

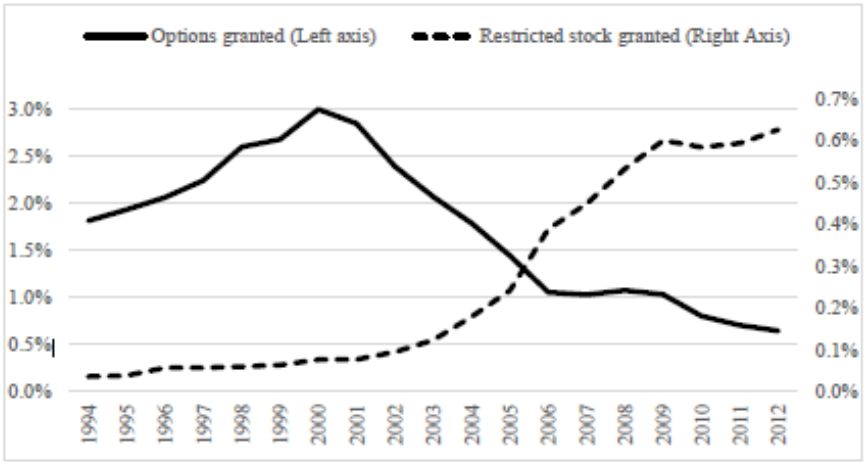


Figure 6. Option grants and restricted stocks from (Bonaimé et al. 2018)

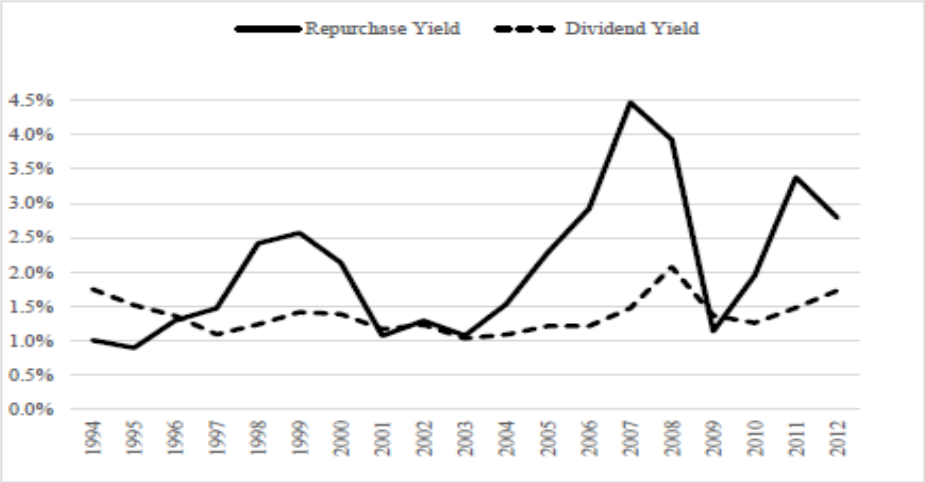


Figure 7. Change in repurchase and dividend yields (Bonaimé et al. 2018.)

Thus, shown in figure 6, the option grants have been declining significantly since the top year of 2000, when stock repurchase programs have been following global economic situation as shown below in figure 8 (Liu et al. 2016). This leads into a conclusion that companies do not announce the buybacks just for completing granted option programs. Even the evidence does not show relationship with options and repurchases, one might argue that management would enjoy the possibility of abnormal returns when their compensation is based more on compensating with options than in salary-based payout method.

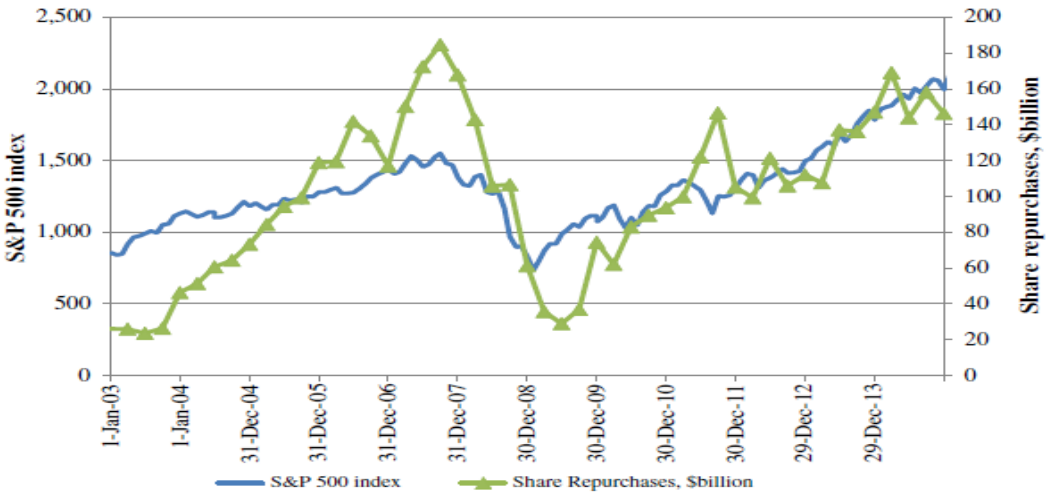


Figure 8. Share repurchases and S&P 500 index 03-14 (Liu et al. 2016.)

Dittmar (2000) study has described that one of the reasons could be that even management do not necessarily announce repurchase to pay options, they do it to distribute cash to shareholders without diluting per-share value. This will lead to increasing value of stock options, when dividends do decrease the value of both stock and options.

2.2.4. Increasing earnings per share

Earnings per share (EPS) is one of the most used tools when valuing a stock. Price of a share can be calculated by dividing total earnings with the number of shares and multiplying it with the target payback period, for example, 15 years.

(7) $$EPS = \frac{\text{Total Earnigns}}{\text{Shares}}$$

When firms repurchase shares, the number of shares is declining, and EPS increases with total earnings. When earlier studies have documented significant increase in EPS following fixed-price tender offers, Grullon & Michaelly (2004) shows that analysts review their forecasts downwards during the month of share buyback announcement. Study shows also evidence that programs above median will receive bigger downward in forecasts. Overall, there is no proof for improvements in the actual EPS nor there is in profitability or operating performance. So, one of the reasons behind the wanted "EPS-Bump" could be that management does not want declining figures of profitability and tries to fix the future problems with repurchases.

Study by Liu & Swanson (2016) has also tested the profitability of firms in time of repurchases. Study finds that companies have decline in return on assets (ROA), when EPS decline is modest thanks to the repurchases. Thus, firms are trying to support the stock price with repurchasing and trying to keep stock overvalued, and not necessarily

tries to signal for undervaluation mentioned earlier. This might be reasoned by managers paycheck being linked in success of EPS-targets.

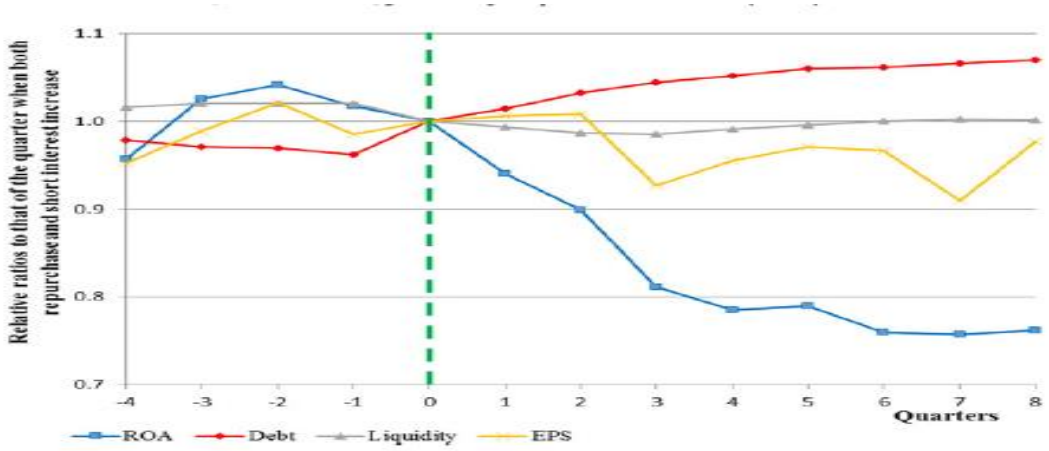


Figure 9. Operating performance around share repurchases (Liu et al. 2016.)

As figure 9 shows, ROA decreases significantly, when debt liquidity and EPS have modest changes. When examine (figure 10) the changes in returns, repurchases, short interest and abnormal returns evidence shows that companies try to avoid the effect of increasing short interest. While analysists find decreasing raw returns, there's increase in short interest, which leads to repurchase programs and short-time abnormal returns.

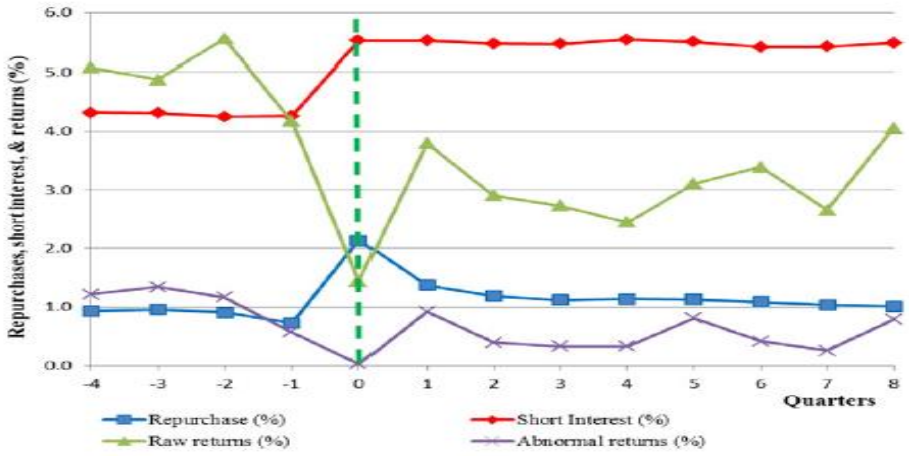


Figure 10. Effects of repurchases by quarters (Liu et al 2016.)

2.2.5. Takeover defense & other minor announced reasons

After describing the most common reasons what companies have used when publishing a stock repurchase programs, study will go through the less used but still well-known reasons for buybacks among academic literature. This will include takeover defense and some other reported reasons and effects of these announcements. Being in history as one of common reason, study will first describe *takeover defense*. When companies are undervalued or/and have some invention with a payout profile one might try to acquire it before market reacts enough. In these situations, one might try first with a public offer to buy all the current shares by giving a tender offer announcement. If board of directors sees an undervaluation, it might try to block the offer first by announcing they do not recommend that shareholders sell shares. Even after this, when a company is publicly traded one might try to start buying all the available shares from the market to achieve a position as big as possible in the company to acquire rest. Dittmar (2000) study describes a situation where some of the shareholders might want to take part for the tender offer, and the company is trying to block buyer for getting too big part from the company. Shareholders who settle for smaller premium are selling the shares for tender price or higher, when others do not. By publishing a repurchase program when the takeover attempt is going, firm will increase the cost of acquisition because of an upward-sloping supply curve. The company will be buying the lower-end from market price to acquisition price and raises the amount that needs to be paid for wanted market share, e.g. 15 %. Based on Dittmar (2000) study, repurchase programs were extra popular in 80´s when there were many hostile takeover attempts in US market.

Billett & Xue (2007) study analyses that even open market programs do not affect as well against takeover attempts as fixed-price tender offers, both are useful in protecting against one. For example, Bagwell (1991) study describes a situation where a company bought back 10 % of shares to avoid a takeover with a great success. Takeover attempts can be also avoided by reverse way. An early study by Sinha (1991) examines that when companies are in the radar to be bought, capital structure will be analyzed carefully. As

this study described there is an optimal capital structure for firms, and by repurchasing shares with debt, it will make the company riskier and thus avoid for a possible hostile takeover attempt.

Also, as mentioned earlier, in crisis companies announce repurchase programs. Gu et al. (2003) study examines how announced buybacks after 9/11 terrorist attack affected the stock markets and abnormal return. Study finds that announcements in following two weeks of attack were to stabilize the markets and had a positive effect on the stock price. This is explained by "*patriotism effect*", as most of the companies that announced buybacks were thought as trying to stabilize the markets and rewarded by patriotic investors. The patriotism can be explained by stock market officials, the government and SEC encouragement for companies to acquire shares to stabilize the market. As mentioned earlier, similar situation was with 1987 stock market crash. The results for 9/11 gave positive effects, even in 1987 when companies also announced repurchase programs, they did not follow through them and investors had reasons to be skeptical for announcements. Reasons behind investors´ optimism in announcements might be because of the decline in stock value, and thoughts that management sees it as undervalued (Gu et al. 2003.)

Firms may also want to *add liquidity* for a stock when there in a nonliquid market to make the share more desirable for investors. Based on the asymmetric information hypothesis, when companies buy back their own share there might be a problem with information, as management is thought to withhold better information as outsiders. Tomperi (2004) study examines with Finnish data how have stock repurchase announcements and actual buybacks affected to firms' market liquidity. Tomperi (2004) uses a bid-ask spread to determinate the effects of repurchases, as well as the volume of repurchases.

(8) $$\text{SPREAD\%} = \frac{(\text{Ask} - Bid)}{[(\text{Ask} + \text{Bid}) / 2]}$$

Results are in line with earlier studies and indicate that small-cap firms bid-ask spreads decreases, and volume increases both after an announcement and after actual repurchases when large companies´ bid-ask spread keeps unchanged with an increase in trading volume. Results show that if a firm desire to increase the volume of changed stock, it should announce a repurchase program to do that. An increased trading volume might add value of a company when markets are afraid of a situation where they need to get rid of it in the future. Other point of view is also presented by Hillert, Maug & Obernberger (2016), which examines data in US markets with findings that even companies provide liquidity in times of crisis when there is a lot of selling-side, companies also want to reduce transaction costs by buying back shares when the liquidity is high. This way firms provide both price support and liquidity in times of crisis.

However, taking maximizing shareholder´s long-term wealth into account, study by Nain & Vijh (2016) has examined whether companies do provide misleading earnings guidance before buybacks to have the change of buying back shares cheaper. Even it would maximize the long-term value of shareholder´s wealth, study finds no evidence of such a behavior.

2.3. Laws and regulations in Finland

Laws for stock repurchases are based on Finnish Limited Liability Companies Act, chapter 15, 5 § (Finlex 2). Companies can purchase their own shares with a decision by general meeting and are obligated to inform an investor about maximum number of shares for each class of shares to be bought, validity of the authorization and minimum and maximum price considering repurchases. A general meeting can authorize a board of directors to choose whether to implement actual repurchases and if so, in which size. Once a General meeting has given the authorization it can be valid for a maximum of 18 months, and because of this, some companies, like Nokia Oyj, will usually give a

repurchase authorization every year in their general meeting, which may or may not be used. There are also restrictions that own shares can only be bought using free equity.

Laws for informing investors about every day's stock repurchases are based on the Securities Markets Act chapter 8, 2 §. The Securities Markets Act allows the managing director of the exchange, in this case director of Nasdaq Helsinki, to give a guideline on the transactions of either acquisition or selling firms own shares. (Finlex 3) As a supplement, also Nasdaq Helsinki rules require Finnish listed companies to publish a release every day before the next exchange date considering done stock repurchases (Nasdaq Helsinki rules 2018)

European union delegated settings of the commission (2016/1052) which takes into concern prevent market abuse article (MAR article 5), has a code considering stock repurchases. Regulations impose that a price of a buyback cannot be higher than either the highest last nonpartisan trade nor higher than the highest bid on the market place. Thus, it can be said that a company is not allowed to boost their stock price using repurchases. Also, MAR 5 article requires that a firm is not allowed to acquire more than 25 % of the average daily volume based on either a) average volume of previous month, which needs to be defined in the publication considering repurchases or b) an average volume of previous 20 trading days before the actual repurchase day. (The official journal of European Union (OJ)

3. LITERATURE REVIEW ON THE IMPACT OF STOCK REPURCHASES

As discussed in the introduction, based on the efficient market hypothesis the abnormal returns in stock buybacks should have disappeared in time with research getting more known in them. Some studies have mentioned this also happen, such as a [study by Fu & Huang (2015) cited in] Manconi et al. (2018). When early studies show significant abnormal returns with announcement, reasonable question would be if the results have changed in time. Study will now go through first the earlier research, following with more resent results to show what have academic literature proven in the years trying to seek if there have been movement with abnormal returns.

Karhunen (2002) reviewed the main studies of announcement effects within 3-day period of an announcement and concluded a table to see different results between the early 70´s before the boom of buyback programs until 1996. As can be seen from table 3, the announcement effect has reduced in both tender offer and open market programs when rarer Dutch auction has been in quite stable 8 %. The study also examines tender offers in Finnish stock markets between 1994 and 2000, which includes total of 23 offers. Based on the results, in Finnish markets an average premium (in this case, average return over 30 days from the announcement) is 27 % with a median of 14 %. A research made in the U.S. stock markets shows similar results, even there can be seen a declining effect from 17.0 % to 7,9 % (Masulis 1980; Lie et al. 1998). More recent study by Yook (2010) finds statistically significant abnormal return of 6.27 % considering announcements with tender offers, when with open market announcements study finds not to be statistically significant, which can be taken as a surprise compared to other academic research. Tender offers tend to outperform open market programs also in event windows of 1 to 12, 1 to 24 and 1 to 36 months. In each time period, study finds tender offers to achieve about 0,20 % better abnormal returns compared to open market programs. Thus, it can be said that abnormal returns have not disappeared, but

it is safe to say that they have declined significantly from the early study by Masulis (1980) reporting announcement effect of 17.0 %.

Table 3. Announcement effect within 3-day period (Karhunen 2002: 8.)

Repurchase method	Study	Sample Period	Sample Size	Announcement effect
Tender Offer	Masulis (1980)	1963 – 78	199	17.0 %
	Dann (1981)	1962 – 76	122	15.4 %
	Lakonishok & Vermaelen (1990)	1962 – 86	221	12.5 %
	Lie & McConnell (1998)	1981 – 94	116	7.9 %
Dutch auction	Comment & Jarrell (1991)	1984 – 88	72	8.0 %
	Bagwell (1992)	1981 – 88	31	7.7 %
	Lie & McConnell (1998)	1981 – 94	91	7.7 %
Open Market	Vermaelen (1981)	1970 – 78	243	3.7 %
	Ikenberry et al. (1995)	1980 – 90	1239	3.5 %
	Stephensen & Weisbach (1998)	1981 – 90	994	2.7 %
	Guay & Hartford (2000)	1981 – 93	1062	2.1 %
	Ikenberry et al. (2000)	1989 – 97	1080	0.9 %
	Kahle (2001)	1993 – 96	712	1.6 %

A more recent study (Högholm et al. 2017) considering abnormal returns in Finland in open market programs has also documented significant returns within announcement. Study uses event study and announcement day to examine the effects of open market programs in time period of -2 to +2 and found abnormal return of 1.51 %. Based on the study, biggest effect is on the announcement day, + 2% abnormal return. Study also notes that average number of days that company repurchases shares in Finland after buyback announcement is 42 days with a median of 27 days. Author´s opinion is that this gives confirmation for our hypothesis formation, where longest analyzed period is 25 days of stock buybacks. Högholm et al. (2007) study also calculates CAAR around the

first actual repurchase in time period of -20 to +20 as figure 11 illustrates. Study finds a strong positive effect on the first day of repurchase and as stated in the study, results are in line with undervaluation hypothesis. Study also notes that positive effect may be driven because of increased demand and not only because of undervalued company. This leads into the next question that Högholm et al. (2017) study do not answer and what is the interest of this study, answering for question of what happens when that increased demand decreases back to normal level. When Högholm et al. (2017) study analyzes the actual first buyback day´s average effect and concludes that it might be reasoned with increased demand, the author´s opinion is that study should have examined also what happens when demand drops, in this case when buybacks end.

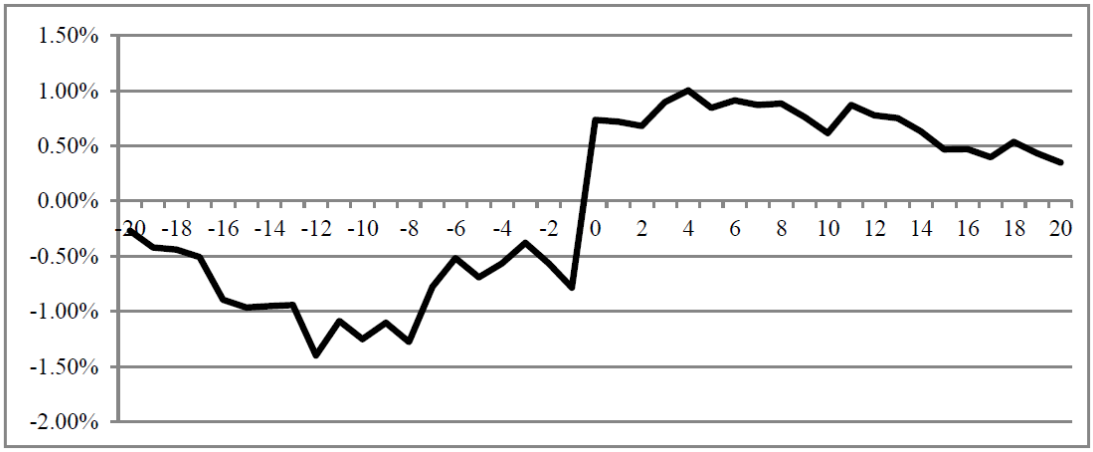


Figure 11. The cumulative abnormal return (CAAR) for first day repurchase (Högholm et al. 2017).

Table 5 (p. 45) capsulize the main results of the latest studies. As can be seen, abnormal returns have not disappeared, nor has it changed significantly as shown especially in Manconi et al. (2018) with a data set from 1998 to 2010. Manconi et al. (2018) study also divided buyback programs into different groups geographically to analyze abnormal return within -6 to 48 months using an event study. Another well documented effect with buybacks is that when dividends have not grown as much as economy, the difference can be explained by growing amount of repurchases as documented in Straehl et al. (2018). Figure 11 presents geographical results from study by Manconi et

al. (2018) that suggests that there can be found a significant difference within groups. America, excluding U.S., having the highest cumulative abnormal return on average when Europe has the worst. Interestingly, as can be seen CAR decreases in Europe three to five months after an announcement. Overall, results suggest that management has clearly managed to time the markets and buy their shares back with lower costs and to maximize long-term shareholder value.

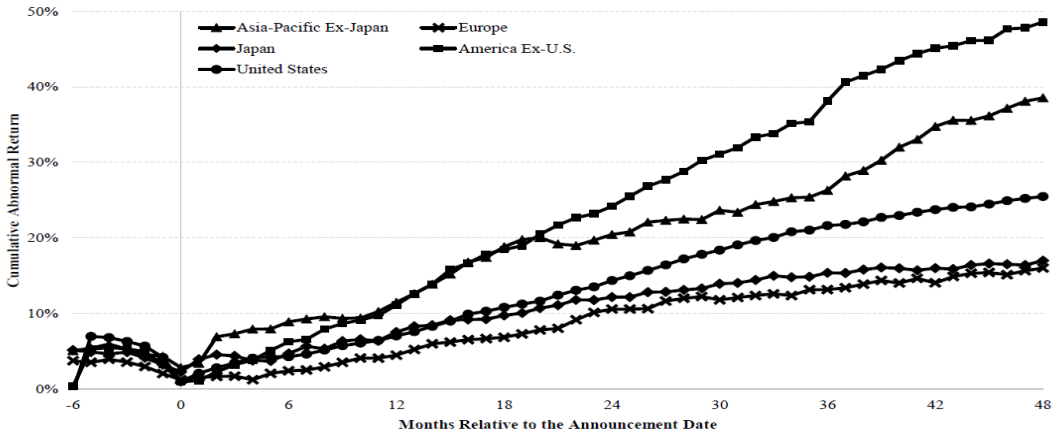


Figure 12. CAR geographically (Manconi et al. 2018.)

Study by Manconi et al. (2018) reports widely results about abnormal returns during an announcement and in a long-time horizon. The research reports 12-month alpha of 3,21 % in Europe, but as all other studies it does not consider if the firms has bought back the shares and what are the day-to-day effects of stock buyback programs. Long-run event studies cited in Manconi et al. (2018) documents abnormal returns between 7,43 % (study by Rasbrant (2013) from Swedish markets) to -7,00 % (study by Rau and Vermaelen (2002) from United Kingdom). These studies, however, are mainly using an authorization as the event and will not even try to explain what happens in stock markets during the buybacks or when they quit acquisitions. Manconi et al. (2018) study reports that in Finnish stock markets the effects of stock buyback programs are:

Announcement Effect		RATS Method		Calendar-Time Method	
Event period	**CAR**	**Event period**	**Alpha**	**Event Period**	**Alpha**
(-1, +1)	1.45*	12 months	-4,43	12 months	-0,3
(-2, +2)	0.62	24 months	5,87	24 months	0,23
(-3, +3)	0.87	36 months	18,41	36 months	0,41
		48 months	25,69*	48 months	0,48

Table 4. Stock buyback programs effects in Finnish stock markets (Manconi et al. 2018).

Table 4 captures the key figures in Finland. Based on the results only two event periods are statistically significant on 10 % level. This leads into the next question, should Finnish companies even use stock buyback programs, or should the money be invested better, if they don't lead into bigger returns and if they don't lead into bigger returns, is it possible to profit form the programs inside the program. Overall, when studies are focusing on the announcement or the overall effect of an authorization, they might give a false picture about stock buybacks. This study aims to give investors and to whom it may benefit a better overview about the short-term effects that will be a great information for day-traders.

As can be captured from table 5 below, most of the latest studies have focused on subjects that are relatively easy to study and get updated information, announcement and authorizations. These, however, are enough studied subject by the authors opinion and the interesting part would is to achieve the new information to use in own trading decisions. The next chapter will give an overview about a new way how to study the effects short term using an event study.

Table 5. Recent studies of stock buyback effects.

Author	Title	Period and method	Contribution & Main results
Andriosopoulos & Lasfer (2015)	The Market Valuation of Share Repurchases in Europe	Announcement & Event study	European data of N =970 in 1997 to 2006. Results demonstrates CAR of 1.55 % (-1, +1)
Dittmar et al. (2016)	Do Corporate Managers Know When Their Shares are Undervalued? (…)	Timing & Comparing RRPs* for frequent repurchases against infrequent	U.S. data of N =2,237 in 2004 to 2011. Infrequent repurchases earn alpha of 0.6 % per month over three months and 0.3 % over 36 months versus frequent repurchases
Straehl & Ibbotson (2017)	The Long-Run Drivers of Stock Returns: Total Payouts and the Real Economy	Total returns 1871 - 2014 & Dividend and cash buyback model	Long data period to examine the changes in total payouts 1871 to 2014. Study describes that taking buybacks into the account has total payoff raised with growth of real economy.
Högholm & Högholm (2017)	Open Market Repurchase Programs (…)	Announcement & Event study	Finnish data of N =293 from 1998 to 2013. Study found announcement effect of 2 % and CAAR 1.51 % (-2, +2)
Manconi, Peyer & Vermaelen (2018)	Are Buybacks Good for Long-Term Shareholder Value? (…)	Announcement & Event study	Non-U.S. N=9,034 (benchmark U.S. 11,096) from 1998 to 2010. Study examines whether abnormal returns have disappeared as EMH suggests, concluding that it is still around 3 %

*RRS stands for relative repurchase price

4. DATA AND METHODOLOGY

To achieve the goal of studying short-term effects of buybacks and days with close to buybacks, the study will have the buyback dates hand-collected from Finnish stock markets. Next subchapters will describe the data and methodology used in this study.

4.1. Data

The study analyzes all firms that are listed before 6/2018 and are still a part of Nasdaq Helsinki overall index. This sample includes 130 different companies, 35 large, 43 medium and 52 small sized firms. The sample period of data is from 2008 to 2017 and in that time, there are 7 215 days of stock repurchases in the sample. 68 of 130 firms had at least one day of stock repurchases in our sample period and 62 companies did not acquire a single share. Firm specific buybacks can be seen from Appendix 1. Daily buyback announcements and the stock price data have been collected from Nasdaq (Nasdaq). Ahlstrom stock data is not available before 03-12-2013, so a buyback sample of 66 days will be excluded from the analysis. This makes the total sample to 7 149 buyback days. Daily index movements of our benchmark index, weighted OMX25, is also downloaded from Nasdaq (Nasdaq) exchange. For missing values of stock or index movement, the study is ignoring them as zeros.

As can be seen from table 5, if companies did acquire shares, mean (median) is 106 repurchase days (69,5 repurchase days), total sample period contains 2514 exchange days, so on average a company that use stock repurchases, do so on 4,22 % of trading days.

Table 6. Descriptive statistics of days

Days		*Days without zero repurchases*	
Mean	55,50	Mean	106,10
Standard Error	8,76	Standard Error	14,23
Median	3,50	Median	69,50
Mode	0,00	Mode	138
Kurtosis	8,48	Kurtosis	4,11
Skewness	2,74	Skewness	1,99
Range	571	Range	570
Minimum	0,00	Minimum	1,00
Maximum	571	Maximum	571
Sum	7215	Sum	7215
Count	130	Count	68

For the data analyzes, firstly, we examine the data to get different time periods, which are a straight 10-days buyback event, following a ten day straight without any buybacks. With limitations, the data includes a total of 99 events that will be analyzed. For a second test, the study uses only events that have 15 days of buybacks without any zero-buy dates, following at least 10 days without any buybacks after that. With this limitation, the study has a total of 63 events in our data period. Thirdly, the study analyzes longer-lasting buyback periods to analyze the effects after buybacks have continued for 25 days with a maximum of three days without any buybacks, following after-buyback period of at least 10 days without any repurchases. This way the study has also 63 events to analyze, some events differing from the second sample. The motivation for these portfolios has been discussed in introduction. Table 6 shows how events divide between years in our sample period.

Table 7. Description of events yearly.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	**Total**
10-day events	24	10	8	14	3	3	8	7	8	14	99
15-day events	14	6	4	10	2	1	8	6	4	8	63
25-day events	15	9	6	6	2	0	3	8	6	8	63

Overall, year 2008 dominates both in events and in single buyback days as can be seen from figure 12. Year 2008 had a total of 1877 buyback days, when 2013 is the lowest with only 324 repurchases. Based on the academic research, this could be explained with good financial situation in pre-2008 and an excess cash flow, together with a declining stock movement and aim to give support for the stock.

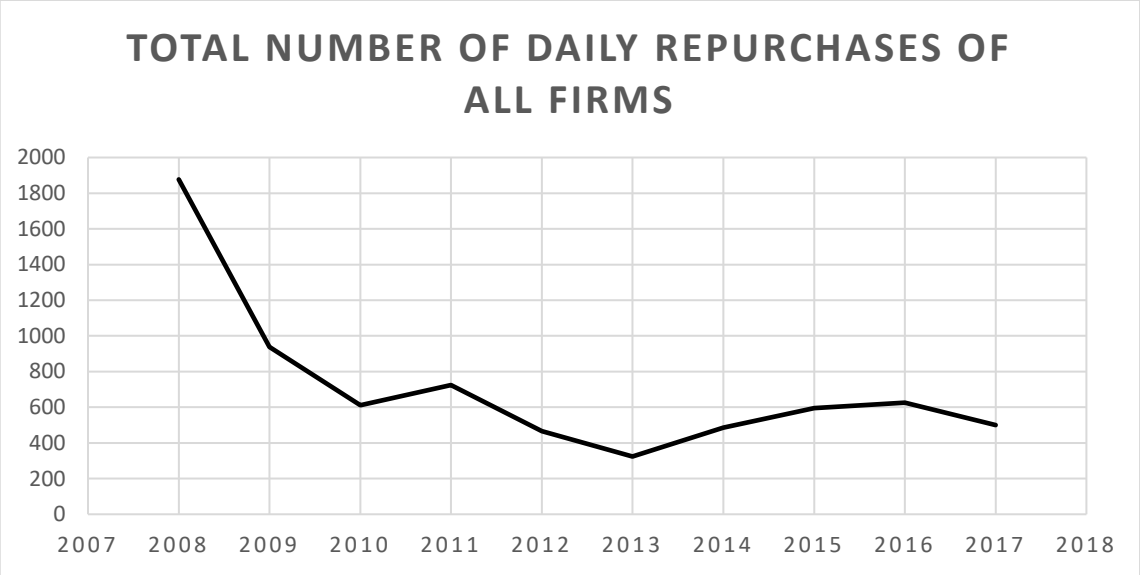


Figure 13. Total number of daily repurchases from 2008 to 2017.

Table 7 shows descriptive statistics from three event-studies that this study exams as well as both descriptive statistics from a logarithmic and a simple return dataset. From average effects can be seen that a shorter event period [-9; 10] reports a negative average return, when the highest average is with the longest studied program. Everyday stock returns while buying back shares are also shown to be 0,082 % (0,084 %) positive.

Table 8. Descriptive statistics

Event	Obs.	Mean	Median	Std. Dev.	Min	Max
[-9;10]	99	-0,126 %	-0,287 %	8,151 %	-20,160 %	34,982 %
[-14;10]	63	1,277 %	0,098 %	10,560 %	-15,528 %	54,295 %
[-24;10]	63	3,484 %	3,762 %	12,934 %	-44,272 %	60,173 %
[0;0]	7149	0,082 %	0,015 %	2,327 %	-15,563 %	42,819 %
Simple return						
[0; 0]	7149	0,084 %	-0,006 %	2,376 %	-14,538 %	53,322 %

For the last tests, this study is analyzing every buyback date as their own event, to achieve an answer whether buyback days are in fact profitable and statistically significant. For this test, market models required beta will be calculated from dates [-250; -1]. Study analyzes all buybacks, including a sample of 7 149 buyback days, 1 377 days from the large companies, 3 126 from medium and 2 646 buyback days from small companies. Profit will also be calculated as an annualized percent of profit.

4.2. Methodology

This study will use an event study to analyze the data for different time periods. The event study will be conducted using a market model to calculate the expected returns and so that the last day of repurchase is considered as our “event day”. The main event window includes a pre-event window with days of stock repurchases and an after-event window including days without repurchases. Figure 13 demonstrates how event study is formed adding a post-event window that is not analyzed in this study. The beta is calculated from 250 trading days using estimation-window as can be seen from figure 13. This method is suggested in Mackinlay (1997) study, and it is the mode of annual trading day in the data period. This should get a solid estimate about the stock movement compared to the market portfolio.

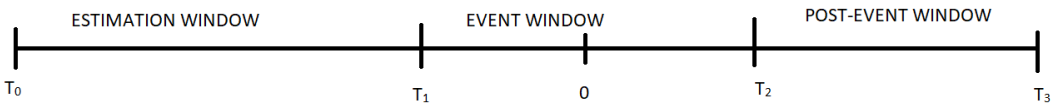


Figure 14. Event study (MacKinlay 1997.)

An event study is described as a model which calculates the return of any security against a market portfolio. A market model is removing expected returns by multiplying market return by the beta. (Mackinlay 1997) An a*bnormal return* is calculated as difference between an actual return and expected returns (Eq. 9). For the *market model* (Eq. 10 & 11), study uses *ordinary least squares (OLS) regression*. *Simple returns* for buyback day´s effects are calculated as the stock value at time t minus the stock value at time t-1 divided by the stock value at time t-1 (Eq. 12).

(9) $$AR_{it} = R_{it} - E(R_{it})$$

(10) $$R_{i,T} = \alpha_i + \beta_i R_{M,\tau} + \epsilon_{i,\tau}$$

(11) $$E\left[\epsilon_{i,T}\right] = 0 \ \& VAR\left[\epsilon_{i,\tau}\right] = \sigma_{\epsilon i}^2$$

(12) $$\mathrm{R_{it}} = \frac{\mathrm{P_i} - \mathrm{P_{i-1}}}{\mathrm{P_{i-1}}}$$

For events, returns are calculated with logarithmic returns as reported in equation 13. Cumulative abnormal returns will be compounded from abnormal returns (Eq 14.). Equation 15 shows how study calculates average abnormal return.

(13) $$r_{it} = ln\left(1 + R_{i,t}\right)$$

(14) $$CAR_{i(\tau_1,\tau_2)} = \sum_{t=\tau_1}^{\tau_2} AR_{i,t}$$

(15) $$AAR = \frac{1}{N}\sum_{t=1}^{N} AR_{it}$$

Cumulative average abnormal returns (CAAR) will be calculated as equation 16 shows, dividing cumulative returns by the number of observations. Annualized profits will be calculated as equation 17 shows, using a potency of 250 divided by event days, amounting the mode of our sample periods yearly exchange dates in a calendar year.

(16) $$CAAR_{(\tau_1,\tau_2)} = \frac{1}{N}\sum_{i=1}^{N} CAR_{i(\tau_1,\tau_2)}$$

(17) Annualized return = $\left(\left((1+r)^{(250/t)}\right) - 1\right)\%$

After achieving results, the study will examine their significance using the cross-sectional T-test (Eq. 18 & 19). Results will be also checked by an adjusted version of standardized cross-sectional test, by Boehmer, Musumeci and Poulson (1991) (eq. 20). Boehmer et al. (1991) suggests that when there is not any event-inducted variance increase, standardized tests are good, but if the variance grows during an event-window, which might be the situation when there is one big buyer more, standardized test rejects a null hypothesis too easily. Boehmer et al. (1991) suggested a better test that is robust to event-inducted variance increases of returns, so their test will be used as well in this study.

(18) $$Tcross = \frac{CAAR_{(\tau_1,\tau_2)}}{\hat{\sigma}^2 CAAR_{(\tau_1,\tau_2)}}$$

(19) $$\hat{\sigma}^2 CAAR_{(\tau_1,\tau_2)} = \frac{1}{N(N-d)}\sum_{i=1}^{N}[CAR_i(\tau_1,\tau_2) - CAAR_i(\tau_1,\tau_2)]^2$$

(20) $$T_{Boehmer\ et\ al.} = \frac{\overline{CSAR}(t_1,t_2)}{S(\overline{CSAR})}$$

5. RESULTS

In this chapter study will focus on what kind of results the collected data provides. The first will describe results that this study found when analyzing every buyback date as its own event and show results of abnormal stock movement around buyback dates. The second subchapter will focus on the results from the shortest event-period, ten-days of buybacks, following a ten-days period without any buybacks. The third subchapter will include our event-period from 15-day buybacks, following ten days period of zero buybacks. The fourth, and last, subchapter will include our longest time period, 25-days of buybacks including a maximum of three days with zero buybacks, following a time period that does not include any buybacks.

5.1. The buyback day effect

The study analyses effects of every stock repurchase day from our data period of 2008 to 2017 to see what results investors should be expecting during buybacks. The estimation window for beta is from t-250 to t-1, 250 trading days. DNA is missing some early values, but will be calculated from about 200 trading days, depending on the buyback date. Study analyses the sample as a whole (N = 7 149) and as groups divided per the market capitalization of companies, large (1 377 repurchase days), medium (3 126) and small (2 646). Company specific size can be seen from appendix 1. Study calculates returns as logarithmic returns and simple returns and checks whether results are statistically significance by the cross-sectional t-test and Boehmer et al. test. Daily returns will be annualized considering 250 trading days in a year.

Results from the portfolio including all stock buybacks show a logarithmic return of 0,0815 %, a simple return of 0,0839 %, both statistically significant on 1 % level (table

11) Annualized returns are 22,602 % and 23,317 %, which suggests great profit opportunity.

Table 9. Daily abnormal returns around stock repurchases days.

	All (N = 7149)	Large (N = 1377)	Medium (N = 3126)	Small (N = 2646)
Log Return	0,0815 % (***)	0,0924 % (**)	0,0614 %	0,0997 %
Tcross	2,9625	2,3397	1,6295	1,7825
prob.	0,0031	0,0193	0,1032	0,0747
Boehmer et al.	2,8937	2,2712	1,7019	1,3775
prob.	0,0038	0,0231	0,0888	0,1684
Annualized %	22,602 %	25,974 %	16,590 %	28,281 %
Simple return	0,0839 % (***)	0,0888 % (**)	0,0605 %	0,1090 %
Tcross	2,9848	2,2406	1,602	1,8823
prob.	0,0028	0,0250	0,1092	0,0598
Boehmer et al.	2,9356	2,2262	1,6843	1,4944
prob.	0,0033	0,026	0,0921	0,1351
Annualized %	23,317 %	24,838 %	16,309 %	31,300 %

The portfolio of large companies suggests daily returns (annualized) of 0,0924 % (25,974 %) and 0,0888% (24,838 %) for logarithmic and simple returns, respectively. Profits from large companies are statistically significant on 5 % level by both tests. The medium sized portfolio shows more modest returns, both statistically significant by Boehmer et al. test, but not by cross-sectional t-test. Logarithmic (simple) return is documented to be 0,0614 % (0,0605 %) in our sample period.

Small firms, however, show statistically significant results just by the cross-sectional t-test, with highest profitability in logarithmic and simple returns, 0,0997 % and 0,1090 %, respectively. Thus, results suggest statistically significant results on both tests just on big companies based on our analysis. This indicates that if one would like to profit in their day-trading from stock repurchases, it should be done using large listed companies in OMX Helsinki.

Compared to the results documented by Manconi et al. (2018), the annualized abnormal return is significantly larger. Manoconi et al. (2018) study reported an average return of 3,21 % in Europe with 12-month time period, when cited studies documented maximum of 7,43 % (Sweden). This shows a clear need for further research considering actual buybacks. Study reported also long-run returns by nation based on RATS (Calendar-time method), Finland documented as -4,43 % (-0.30 %). The results of this study suggest that stock buybacks generate positive abnormal returns, but on average the stock price decreases after buybacks.

5.2. The 10-day portfolio

Our ten-day portfolio is having 99 events and showing some cumulative average abnormal returns that are statistically significant both by Cross-sectional t-test and Boehmer et al. significance test. The estimation window is above-mentioned 250 trading days, a period that starts t-259 days before and ends at time t-10 [-259; -10], except DNA (containing one event) that has an estimation window of 189 days, because lack of data due IPO 2016. The study has a main event window of [-9; 10], with subside event windows of [-9; 0] [-4; 0] [-2; 0] [0; 0] and [1; 3] [1; 5] [1; 9] [1; 10].

As table 8 shows, analysis from close-to-event time periods, [-4; 0] [-2; 0] and [1; 3] [1; 5] are statistically significant on 5 % level both on the cross-sectional t-test and Boehmer et al. significance test. Study suggests that if one would like to profit from the short-term movements around days when a company will end its repurchase program, that would be possible buying five days pre-ending the program and short-selling at the last event day. This could be done by for example, buying shares from a company having ongoing buybacks before the silent period announced by the company itself. As annualized returns shows, two days pre-event day and three days after event day shows significant results of 75,90% and -58,51 %, respectively. When not counting for transaction costs, one could profit by buying shares from a company that will end repurchases after three

days, and short sell in the first day that the company will not buy any shares for three to nine days.

Table 10. The results from [-9; 10] event-study.

Event	CAAR (%)	Tcross	prob.	Boehmer et al.	prob.	Annualized
[-9; 10]	-0,130	-0,153	0,8782	-0,307	0,7589	
[-9; 0]	0,780	1,429	0,1531	1,292	0,1964	
[-4; 0]	0,830**	2,050	0,0404	1,9746	0,0483	51,18 %
[-2; 0]	0,680**	2,004	0,0451	2,1299	0,0332	75,90 %
[0; 0]	0,260	1,341	0,1799	1,355	0,1754	
[1; 3]	-1,050***	-2,578	0,0099	-2,4623	0,0138	-58,51 %
[1; 5]	-1,250**	-2,681	0,0074	-2,8338	0,0046	-46,68 %
[1; 9]	-1,310*	-2,113	0,0346	-1,9269	0,054	-30,67 %
[1; 10]	-0,910	-1,445	0,1484	-1,4443	0,1487	

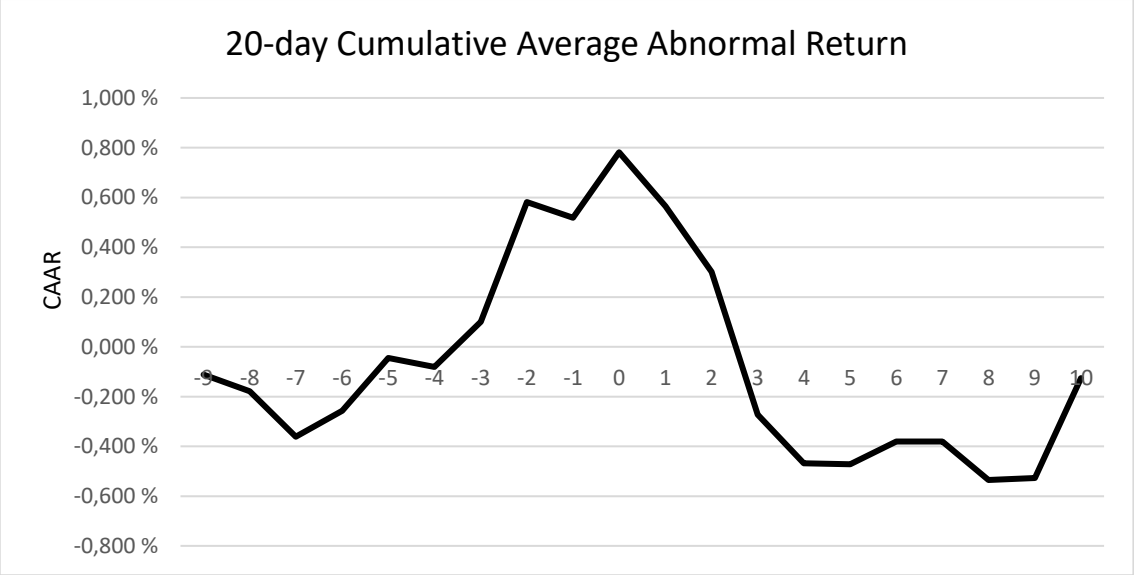


Figure 15. Plotted 20-days CAAR movement.

Figure 14 demonstrations the average stock movement around the main event window. Figure shows abnormal returns starting to cumulate in around five days (-4 + day-0)

before a company ends its buyback program, rising to 0,782 %. After repurchases are done, the value of a share starts to decline for around four days, falling for cumulative -0,468 %. Interestingly, we can see a drop in cumulative abnormal returns in around seventh day, which this study cannot explain. For rising CAAR in end of event period (day ten) might be explained by a market normalization after buybacks or markets reacting before financial statements that companies are giving after a quiet period. Overall, study finds statistically significant results around short-term buyback periods, but considering the main event window (20 days), study finds insignificant.

5.3. The 15-day portfolio

Study analyses a sample of 63 events with at least fifteen days of continuous stock repurchases following a time period of at least 10 days where a firm do not acquire any shares. An estimation window is used to calculate beta using a time period of 250 days starting from t-264 and ending in t-15, except DNA that contains only 184 days because of IPO 2016. Study analyses cumulative average abnormal returns (CAAR) in the main event-period of -14 to 10, with subside event-periods of [-14; 0], [-9; 0], [-4; 0], [-3; 0], [0; 0] and [1;3], [1; 5], [1; 9] and [1; 10].

Table 9 describes results, analysis suggests that with longer-lasting stock repurchase programs closer-to-events are again statistically significant both by cross-sectional t-test and Boehmer et al. test. Study finds statistically significant cumulative abnormal returns for the last five and four days of 1,1 % and 1,33 %, respectively, before a firm ends their buyback program. However, study finds only event period of five days of no-repurchase days as statistically significant on 10 % level, which suggests lower effects comparing to shorter buyback programs. The last day of repurchases however study finds positive and statistically significant on 5 % level, average of 0,57 percent per day or 314,11 % annualized. Thus, results indicate that longer lasting repurchase programs are more profitable in a short-term analysis comparing to shorter-term events that include only a

straight ten days of stock repurchases. The overall effect of main the event window (25-days), study finds not to be statistically significant.

Table 11. The results from [-14; 10] event-study.

Event	CAAR (%)	Tcross	prob.	Boehmer et al.	prob.	Annualized
[-14; 10]	1,280	0,9601	0,337	0,5566	0,5778	
[-14; 0]	1,740	1,6618	0,0966	1,1707	0,2417	
[-9; 0]	1,110	1,5069	0,1318	1,2687	0,2046	
[-4; 0]	1,100*	2,0044	0,045	1,7998	0,0719	72,81 %
[-3; 0]	1,330**	2,5738	0,0101	2,4139	0,0158	128,36 %
[0; 0]	0,570**	2,1494	0,0316	2,1257	0,0335	314,11 %
[1; 3]	-0,760	-1,8793	0,0602	-1,5918	0,1114	
[1; 5]	-0,920*	-1,7588	0,0786	-1,9038	0,0569	-37,01 %
[1; 9]	-0,870	-1,3402	0,1802	-1,0485	0,2944	
[1; 10]	-0,460	-0,6513	0,5148	-0,6366	0,5244	

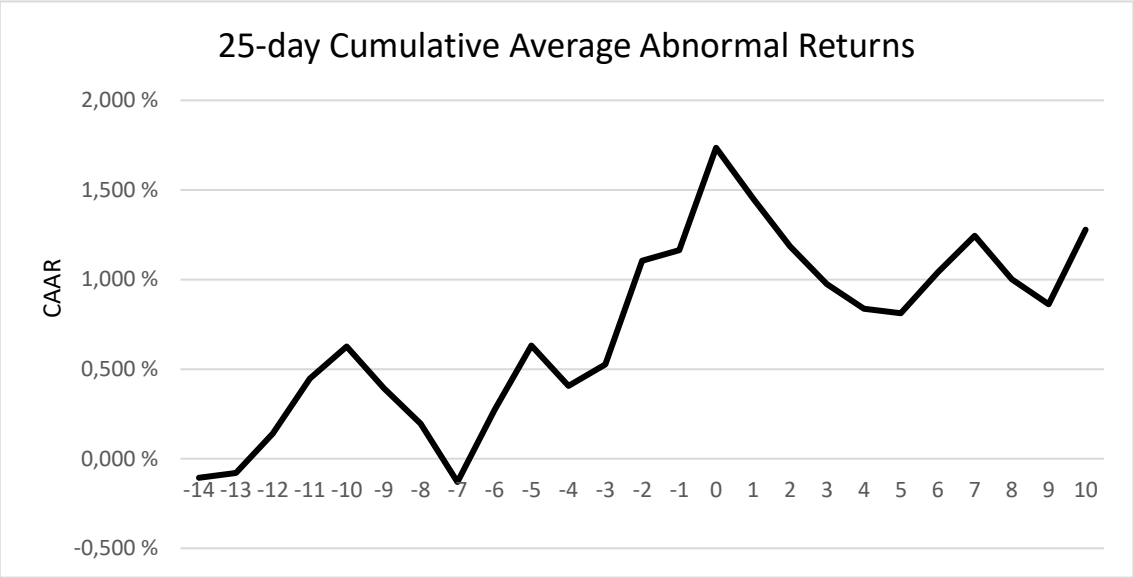


Figure 16. Plotted 25-days CAAR movement.

Figure 15 shows plotted results from the 25-day event study, 15 days with buybacks and 10 days without. As figure 15 shows, cumulative abnormal returns are again falling at

time t-7 for an unexplained reason but starts to cumulate into a strong growth after that. Study finds the last buyback date, marked as zero, as the highest cumulated average abnormal return, standing at 1,735 %. Cumulative returns start declining after a company ends their buybacks, staying still at 0,811 % positive at its lowest. Thus, results suggest that when a company end their stock repurchases, it has a significant effect on short-term stock price. The biggest percentual decline happen directly after the end of repurchases.

5.4. The 25-day portfolio

The event study of longer repurchase programs include events of at least 25 buyback days of buybacks, which contains a maximum of three days without stock buybacks, following ten-days without buybacks includes 63 events. This type of open-market repurchases are more common in long-lasting programs where a company might aim to distribute excess capital to shareholders without influencing the actual share price. Estimation values are calculated using 250 trading days, starting at t-274 and ending at t-25, except one event from DNA, containing only 174 trading days data in the estimation window when calculation for beta because of IPO 2016. Study analyses event-periods of the main event window, [-24; 10], with subside event-windows of [-24; 0], [-19; 0], [-14; 0], [-9; 0], [-4; 0]; [-2; 0] and [0; 0] with post event windows of [1; 3], [1; 5], [1; 9] and [1, 10].

Table 10 documents results from the analysis. Events that contain stock repurchases days, are positive and mainly statistically significant. The main event window of 35 trading days, achieves a cumulated average abnormal return of 3,48 %, statistically significant on 5 % level. Events of [-24; 0], [-19; 0], [-9; 0], [-4; 0] and [-2; 0] cumulates of 2,760 %, 2,490 %, 1,430 %, 1,110 % and 1,430 % CAAR, respectively. Annualized abnormal returns show the highest cumulated average abnormal return during the last stock repurchase days, 226,49 %. The study, however, finds no significant effect on

ending a stock repurchase program with the 25-day portfolio. Study still reports negative effects on the stock price with events of [1;3], [1;5] and [1;9]. This indicates together with the results from previous portfolios that there might be a small negative effect in the stock price when a company quits its program.

Table 12. The results from [-24; 10] event-study.

Event	CAAR (%)	Tcross	prob.	Boehmer et al.	prob.	Annualized
[-24; 10]	3,480**	2,1383	0,0325	2,0071	0,0447	27,68 %
[-24; 0]	2,760**	2,1050	0,0353	1,9726	0,0485	31,29 %
[-19; 0]	2,490*	1,8516	0,0641	1,7763	0,0757	35,99 %
[-14; 0]	1,650	1,5495	0,1213	1,3343	0,1821	
[-9; 0]	1,430*	1,8267	0,0677	1,7259	0,0844	42,61 %
[-4; 0]	1,110*	1,9295	0,0537	2,2035	0,0276	73,66 %
[-2; 0]	1,430***	2,8000	0,0051	3,2709	0,0011	226,49 %
[0; 0]	0,370 %	1,2254	0,2204	1,3252	0,1851	
[1; 3]	-0,370 %	0,8966	0,37	-1,0154	0,3099	
[1; 5]	-0,690 %	-1,2661	0,2055	-1,6923	0,0906	
[1; 9]	-0,240 %	-0,3407	0,7334	-0,4777	0,6328	
[1; 10]	0,720 %	0,8538	0,3932	0,576	0,5646	

Plotted results together with a trendline (figure 16) shows a rising effect on longer stock repurchase programs considering CAAR. Companies that do acquire their shares for a longer period, do not receive as negative effects from investor when ending their program. The highest CAAR during a 34-day event (-24; 9) is at time t1, which indicates that stocks tend to rise even after a company ends its stock repurchases. Even also longer repurchase programs do have a negative effect on day -7, their lowest CAAR point is in the beginning of the buybacks. This indicates that if a company wishes to achieve greater positive short-term effects on the stock price, they should implement their stock repurchases in a longer time period.

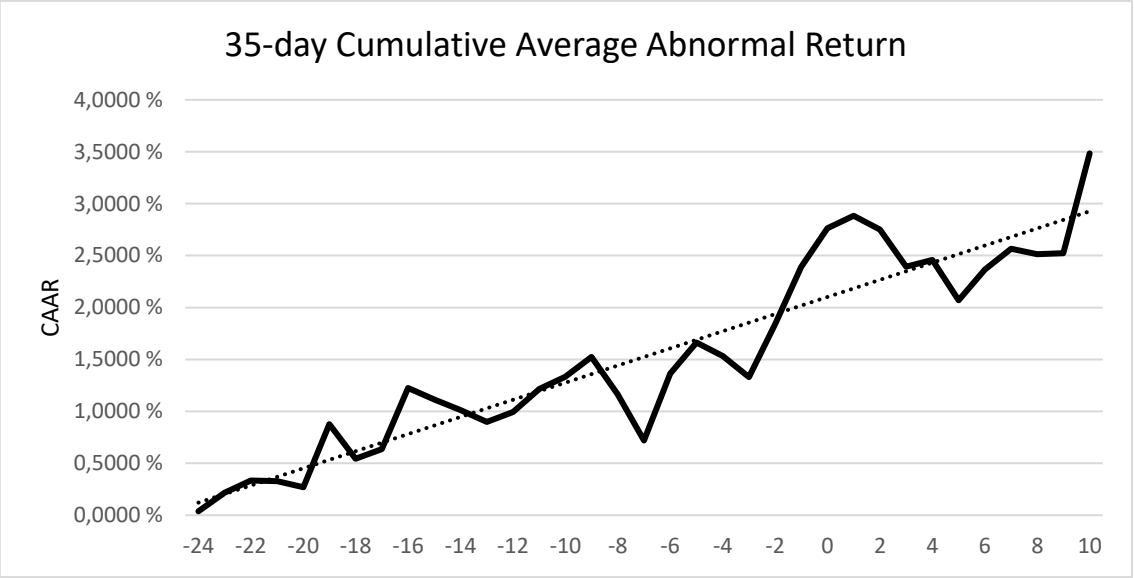


Figure 17. Plotted 35-days CAAR movement.

Thus, considering our hypotheses, the study accepts H1 as results suggest there is a positive effect during buybacks when analyzing only the daily impact of repurchases. As well as study accepts H2 because of portfolios of ten and fifteen days of buybacks shows statistically significant negative results following the period, this however, can be argued when our 25-day portfolio did not find negative but not statistically significant results.

6. CONCLUSION

This master´s thesis aimed to answer what happens during and after the buybacks in short-term considering open market programs in Finland for time period of 2008 to 2017. Being the most used program, open market program is widely studied across academics. However, the previous studies have focused on announcement or overall long-term effect without considering differences between days that firms acquire shares and days when they do not. When previous study from Manconi et al. (2018) reported negative long-term abnormal returns from Finland, this study finds significant positive effects during actual buybacks and negative effects directly after repurchases using event study. This is a key finding for ongoing academic literature about stock buybacks. Stock repurchase programs should be examined more deeply to get better results how do the abnormal returns cumulate.

Study uses an event-study to investigate how CAAR develops around days when a company is buying back shares using open market program and what happens in the stock price when they end the program. The portfolio formation, however, could not be found from previous literature being one of the first studies to examine short-term impacts of actual buybacks. Study motivates the reasons why to form portfolios based on the previous research about ex-dividend impact and characteristics on a typical repurchase program. The study chooses to use portfolios of ten and fifteen days of continuous buybacks and a portfolio that includes 25-days of buybacks with an allowance that the time period can have a maximum of three days without any buybacks. All portfolios are followed by a ten-day time period when the company does not buy a single share to investigate the impact of ending a repurchase program.

The study is answering to hypotheses H1: daily stock buyback have a positive effect on the stock price and H2: Ending stock buybacks have a negative effect on the stock price. Study finds a positive effect of 0,0815 % during stock repurchases and accepts H1 to be statistically significant on 1 % level. When study examines the impact of ending the stock

buyback program using a portfolio formation method and an event study, results suggests that the stock price declines on average. Thus, H2 is also accepted.

The study finds a positive effect especially for last five days of stock repurchases and negative effects from after-buyback period of 1 to 5 days. Results suggest that even past literature has documented mainly positive effects from repurchases, there can be found unique characteristics inside timeline. This information may benefit both investors and companies depending their goal considering a portfolio formation or what do managers aim to achieve from a stock buyback program.

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APPENDIX 1. Firm specific summary statistics.

Size	Company	Days	10-day Events	15-day Events	25-day Events
Lage	Ahlstrom-Munksjö*	138	3	2	2
Lage	Amer Sports	160	4	2	1
Lage	Cargotec	41	1	0	1
Lage	Citycon	1	0	0	0
Lage	DNA	75	1	1	1
Lage	Elisa	28	1	1	1
Lage	Finnair	42	2	2	1
Lage	Fiskars	129	4	3	3
Lage	Fortum	0	0	0	0
Lage	Huhtamäki	0	0	0	0
Lage	Kemira	0	0	0	0
Lage	Kesko B	53	0	0	0
Lage	Kojamo	0	0	0	0
Lage	KONE	68	1	0	0
Lage	Konecranes	35	1	1	1
Lage	Metso	25	2	0	0
Lage	Metsä Board	0	0	0	0
Lage	Neste	23	1	1	0
Lage	Nokia	393	11	9	9
Lage	Nokian Renkaat	0	0	0	0
Lage	Nordea	0	0	0	0
Lage	Orion B	32	1	0	0
Lage	Outokumpu	18	1	0	0
Lage	Sampo	39	1	1	0
Lage	Sanoma	103	4	3	2
Lage	SSAB	0	0	0	0
Lage	Stora Enso	0	0	0	0
Lage	Telia Company	0	0	0	0
Lage	Terveystalo	0	0	0	0
Lage	Tieto	12	1	0	0
Lage	UPM	0	0	0	0
Lage	Uponor	14	1	0	0
Lage	Valmet	0	0	0	0
Lage	Wärtsilä	0	0	0	0
Lage	YIT	14	0	0	0
Medium	Aspo	132	1	0	0
Medium	Caverion	15	1	1	0
Medium	Cramo	0	0	0	0
Medium	Lassila & Tikanoja	112	4	2	2
Medium	Lehto Group	0	0	0	0
Medium	Outotec	5	0	0	0
Medium	Ponsse	91	3	1	1
Medium	Pöyry	108	1	0	1
Medium	Ramirent	82	3	2	2
Medium	Robit	5	0	0	0
Medium	Scanfil	0	0	0	0
Medium	SRV Yhtiöt	185	1	1	1
Medium	Tikkurila	24	1	1	0
Medium	Vaisala	340	2	1	2
Medium	Altia	0	0	0	0
Medium	Atria	68	0	0	1
Medium	HKScan	2	0	0	0
Medium	Olvi	17	1	0	0
Medium	Raisio	267	4	4	4
Medium	Rapala VMC	571	3	2	1
Medium	Rovio Entertainment	0	0	0	0
Medium	Suominen	39	0	0	0
Medium	Oriola B	11	1	0	0
Medium	Pihlajalinna	0	0	0	0
Medium	Revenio Group	61	3	2	1
Medium	Alma Media	64	1	1	1
Medium	Kamux	0	0	0	0
Medium	Stockmann	0	0	0	0
Medium	Tokmanni Group	0	0	0	0
Medium	Viking Line	0	0	0	0
Medium	Aktia Pankki	133	3	3	2
Medium	Asiakastieto Group	0	0	0	0
Medium	CapMan	40	0	0	1
Medium	eQ	48	1	0	0
Medium	Evli Pankki	0	0	0	0
Medium	Suomen Hoivatilat	0	0	0	0
Medium	Taaleri	0	0	0	0
Medium	Technopolis	131	0	0	2
Medium	Ålandsbanken	21	0	0	0

Medium	Basware	120	0	0	0
Medium	Bittium	0	0	0	0
Medium	F-Secure	293	7	6	6
Medium	Teleste	141	3	2	2
Small	Afarak Group	154	2	2	1
Small	Endomines	0	0	0	0
Small	Sotkamo Silver	0	0	0	0
Small	Aspocomp Group	0	0	0	0
Small	Componenta	0	0	0	0
Small	Consti Yhtiöt	0	0	0	0
Small	Dovre Group	16	0	0	0
Small	Efore	71	0	0	0
Small	Elecster	0	0	0	0
Small	Etteplan	294	5	2	2
Small	Exel Composites	0	0	0	0
Small	Glaston	0	0	0	0
Small	Incap	0	0	0	0
Small	Kesla	0	0	0	0
Small	Neo Industrial	43	0	0	0
Small	Nurminen Logistics	0	0	0	0
Small	Raute	16	0	0	0
Small	Talenom	0	0	0	0
Small	Tulikivi A	91	0	0	1
Small	Uutechnic Group	0	0	0	0
Small	Valoe	0	0	0	0
Small	Wulff-yhtiöt	115	0	0	0
Small	Yleiselektroniikka	0	0	0	0
Small	Apetit	46	1	1	0
Small	Harvia	0	0	0	0
Small	Honkarakenne	94	0	0	0
Small	Marimekko	0	0	0	0
Small	Martela	0	0	0	0
Small	Saga Furs	0	0	0	0
Small	Biohit	0	0	0	0
Small	Silmäasema	0	0	0	0
Small	Ilkka-Yhtymä	0	0	0	0
Small	Keskisuomalainen	1	0	0	0
Small	Kotipizza	0	0	0	0
Small	Pohjois-Karjalan Kirjapaino	0	0	0	0
Small	Restamax	72	0	0	0
Small	Investors House	0	0	0	0
Small	Orava Asuntorahasto	0	0	0	0
Small	Panostaja	138	4	3	3
Small	Sievi Capital	109	0	0	0
Small	Digia	123	1	0	2
Small	Digitalist Group	0	0	0	0
Small	Innofactor	271	1	0	2
Small	Nixu	0	0	0	0
Small	QPR Software	400	0	0	0
Small	Qt Group	0	0	0	0
Small	Siili Solutions	0	0	0	0
Small	Solteq	454	0	0	0
Small	Soprano	138	0	0	0
Small	SSH Communications Security	0	0	0	0
Small	Tecnotree	0	0	0	0
Small	Trainers' House	0	0	0	0
	SUM	**7215**	**99**	**63**	**63**

* Ahlstrom-Munksjö´s 66 buyback days excluded because lack of data.